ALEXA Family of Cameras

Software Update Packet 8.1 (ALEXA XT/XR)
Software Update Packet 8.0 (ALEXA Classic)

USER MANUAL

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1 Disclaimer

Before using the products described in this manual be sure to read and understand all respective instruction.

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This product meets CE regulations.

1.1 About This Manual

ARRI recommends that all users of the ALEXA read the manual in its entirety prior to use. For experienced users, the manual's structure also provides quick access for reference.

In this manual:

- Layout of the ALEXA
- Safety Guidelines
- General Precautions
- Power Supply
- Camera Support
- Connectors
- Lens Mounting
- User Interface
- Operation of the ALEXA

How to Use This Manual

All directions are given from a camera operator's point of view. For example, camera-right side refers to the right side of the camera when standing behind the camera and operating it in a normal fashion.

Connectors are written in all capital letters, for example, REC OUT. Menus and screens on the Main Camera Controls are written in all capital letters, for example, RECORDING menu and HOME screen. Buttons are written in bold typeface capital letters, for example, **PLAY** button.

The appendix at the back of the manual contains useful reference material including ALEXA specifications, connector pin-out diagrams, a false color display explanation, error and warning message explanations, ALEXA dimensional drawings and a menu structure tree.

2 Scope

This instruction manual applies to the following hardware, software and firmware versions:

ARRI ALEXA, ARRI ALEXA Plus, ARRI ALEXA Plus 4:3, ALEXA M: with ARRI EVF-1 electronic viewfinder;

ARRI ALEXA XT, ARRI ALEXA XT Plus, ALEXA XT M: with ARRI EVF-1 electronic viewfinder;

ARRI ALEXA HD, ARRI ALEXA HD Plus: with ARRI EVF-1 electronic viewfinder;

ARRI ALEXA Studio, ARRI ALEXA XT Studio: with optical viewfinder or ARRI EVF-1 electronic viewfinder;

- Camera software update packet (SUP) for ALEXA XT cameras and ALEXA Classic cameras with XR module upgrade: 8.1
- Camera software update packet (SUP) for ALEXA Classic cameras with **SxS** module: 8.0

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3 Introduction to the ALEXA

ARRI ALEXA is an extraordinary 35mm format digital camera system designed for motion pictures and television, consisting of eleven cameras and an extensive range of primes, zooms, accessories and recording solutions. Combining innovative digital technology with 95 years of ARRI history and experience has created a camera system that makes it easy to create great looking images.

- The ALEXA and ALEXA XT provide the most affordable entry with full ALEXA image quality.
- ALEXA Plus adds support for the ARRI Wireless Remote System (WRS), cmotion cvolution lens control, ARRI Lens Data System, an additional HD-SDI and RS output and expanded metadata.
- ALEXA Plus 4:3 and ALEXA XT Plus share the same features as the ALEXA Plus but with a taller usable sensor area (4:3) for plug-and-play use with anamorphic lenses. Providing unmatched versatility, the ALEXA Plus, ALEXA Plus 4:3 and ALEXA XT Plus have become the workhorses of the industry.
- ALEXA M and ALEXA XT M are specialists; a modular system with a separate camera head and body for action oriented cinematography, aerial mounts and 3D.
- The flagships of the range, the ALEXA Studio and ALEXA XT Studio, are the only digital motion picture cameras with an optical viewfinder and a rotating mirror shutter.
- The ALEXA HD and ALEXA HD Plus form the basis of the ALEXA Fiber Remote and ALEXA Fiber Remote camera sets. Since they are designed for HD-only use, they do not include and cannot be upgraded to ARRIRAW, ProRes 2K, 4:3, 3D sync or the XR Module.

All ALEXA cameras offer *exceptional image quality* with the organic look and feel of film; their unequalled exposure latitude, high sensitivity and unique ARRI color processing provide sharp and natural images with a cinematic look of breathtaking richness and detail.

Making them the perfect tools for a wide range of workflow and budget requirements, ALEXA cameras allow for the most *efficient and versatile workflows*. They can simultaneously output a number of formats, all with audio and metadata. Their ability to record Apple ProRes (in HD or 2K*) or Avid DNxHD** images to in-camera media offers file-based workflows of unparalleled efficiency for immediate time and cost savings. ARRIRAW* (in-camera with XT cameras and ALEXA Classic cameras upgraded with the XR Module) delivers the pinnacle in image quality, postproduction flexibility and archiving peace of mind, while the HD-SDI outputs integrate seamlessly into existing HD infrastructures.

ALEXAs are true ARRI cameras: *simple and safe to operate*, ergonomic in design and *reliable* in even the most extreme environments. ALEXA cameras are designed around the way you work and, like all other ARRI products, are backed by the global ARRI service network.

To provide more choices to the filmmaker, the ALEXA system is based on an *open architecture* with many industry-standard interfaces and compatibility with third party products. This, in combination with a number of components on the camera that can be upgraded and long product cycles make the system *future-proof* and ensures a safe return on investment.

More than just hardware, ALEXA cameras represent an entire image pipeline that stands alone as the most complete and powerful digital production system ever built.

Exceptional Image Quality

- Film-like, organic look
- Wide exposure latitude
- 14 stops over the entire EI range as measured with the ARRI Dynamic Range Test Chart
  - Extended, clean highlights
  - Extremely low noise floor
- High sensitivity
  - Base EI 800
  - Adjustable from EI 160 to EI 3200
- ARRI color science
  - Natural color reproduction (especially for skin tones)
  - Excellent color separation
  - Holds up extremely well when over or underexposed
- Sharp, natural images for HD, 2K or 4K deliverables

All ALEXA cameras provide the best looking digital image with the least amount of fuss. This is made possible by a unique imaging chain consisting of a high end optical low pass filter, a custom made CMOS sensor with Dual Gain Architecture (DGA) and custom electronics and processing software. These components are carefully crafted by ARRI so that together they produce images with the organic look and feel of film. The sensor provides unequalled exposure latitude of 14 stops over the entire EI range, with special consideration given to a gentle highlight treatment. Creating a good looking roll-off in the highlights is probably one of the most difficult tasks for any camera designer and we have spent enormous resources at insuring ALEXA's outstanding performance in the critical area between almost overexposed and fully overexposed. ALEXA's high sensitivity and its ability to hold up very well even when extremely under- or overexposed speed up work on any real-world set. ALEXA's color processing was developed by our own color scientists (who are the same people that have been working on the ARRILASER and ARRISCAN, so are intimately familiar with both film and digital color science), and creates clean and natural colors, especially noticeable in ALEXA's great looking skin tones. The low noise floor and great color separation helps greatly in color correction and compositing. Our goal is creating the best looking images, and when assessing imaging technologies, we always ask if it improves the image, disregarding the marketing hype. With ALEXA we have, as the visual effects supervisor of *The Avengers* put it, created "better pixels".

Efficient and Versatile Workflows

- Multiple output options
  - ARRIRAW*, ProRes, DNxHD** and HD-SDI
  - Log C or Rec 709 gamma
  - ARRI Look Files for custom looks
  - Audio recording
  - Metadata embedded in all file formats and outputs
- Apple ProRes
  - In-camera file-based recording
  - Onto **SxS PRO** cards and XR Capture Drives
  - All five Apple ProRes codecs
  - HD or 2K*, 16:9 or 4:3
  - Native Final Cut Pro support
- ARRIRAW*
  - uncompressed, unencrypted raw sensor data
  - greatest image quality from ALEXA
  - greatest flexibility in post
  - best option for future-proof archiving
- DNxHD**
  - in-camera recording
  - MXF wrapped files (SMPTE standard compliant)
  - DNxHD 145 and DNxHD 220x codecs
  - native Avid Media Composer support
- Online tools and downloadable apps

ALEXAs easily fit into many different types of projects because of the versatility of their multiple outputs. ALEXAs can record and play back Apple ProRes (in HD or 2K* resolution and 16:9 or 4:3 aspect ratio) or DNxHD** in-camera onto **SxS PRO** cards or XR Capture Drives, and ARRIRAW in 16:9 and 4:3 aspect ratio onto XR Capture Drives. Alternatively, uncompressed HD-SDI can be recorded with an external recorder. Images can be recorded and/or output in Log C or Rec 709, with optional Look Files for an accurate preview on set and with a full set of rich metadata to streamline production. So disregarding if you want to shoot a low budget TV series or Martin Scorsese's next big Hollywood feature film, ALEXA can be easily configured for the task at hand.

Simple and Safe Operation

- ARRI Product Quality
- Rugged and reliable
  - sealed electronics compartment
  - unique cooling system
  - stable lens mount/sensor holder
- Intuitive, easy to use controls
  - same interface on all ALEXA models
- High quality electronic viewfinder
- Powerful assistive displays, including
  - surround view
  - false color exposure check
  - smooth mode for better motion portrayal
  - peaking focus check
  - compare stored image with live image
  - RETURN IN video
- Well balanced, ergonomic body design
- Global ARRI service network

ALEXA cameras are part of a long heritage of cameras from ARRI, and we are very familiar with the sometimes horrid things done to our cameras in the field. We just have to go into our own service department to see the carnage! So ALEXAs are built rugged and reliable with a sealed electronics compartment, a unique cooling system and the most stable lens/sensor mount German engineering could devise. All ALEXAs are backed by ARRI's global service network, providing a friendly ARRI service technician accessible 24/5.

We know what it is like to try to change fps and shutter angle at 4:00 am in the morning in the rain after a long night shoot. Professional cameras need to be very simple to operate, and they need to make sure that a good looking image is recorded, no matter what. With ALEXA we have developed an intuitive user interface that is easy to learn and quick to operate. The same interface is used on all models of ALEXA, with the same menu, buttons, etc., so there is no learning curve when using another model ALEXA.

Critically important to camera operators is the viewfinder. Based on our experience with optical viewfinders, ALEXA's electronic viewfinder provides an exceptionally clear image with natural skin tones and smooth motion portrayal that is easy on the eye. For those who appreciate the advantages of optical viewfinders, the ALEXA Studio can be operated with an optical or electronic viewfinder. The electronic viewfinder includes powerful assistive displays like surround view, false color exposure check or anamorphic de-squeeze.

The hardware of the camera is designed for the best and most ergonomic use on the set, including the built-in shoulder cut-out, many attachment points on the camera's precision machined housing and a large numbers of accessories like the low mode set, the Remote Control Unit RCU-4 or the Wireless Compact Unit WCU-4. With meticulous attention to detail we have added many small but helpful design refinements, including built-in supports for 15 mm lightweight rods or differently shaped extrusions (eyebrows) above some buttons so the operator can feel the button's position even from the other side of the camera or shooting in low light. The same care has been taken to ensure compatibility with the extensive range of exiting accessories.

ALEXAs are well balanced and can be quickly switched from shoulder use to tripod, crane or Steadicam. They accept a wide range of power input from 10.5 to 34 V DC. Multiple power sources can be simultaneously connected (with hot plug capability) and a smart circuit will automatically switch to the one with the highest voltage.

Open, Future Proof Architecture

- Compatibility with industry standards
  - PL mount lenses
  - Apple ProRes, Avid DNxHD**, HD-SDI and **SxS PRO** cards
  - Gold mount or V-lock on-board batteries
  - 12 or 24 V power inputs and outputs
  - Support for ARRI and cmotion cvolution wireless lens control systems
  - Support for third party on-board recorders
  - ARRIRAW* support for third parties through ARRI Partner Program and ARRIRAW SDK
- Numerous upgrade options
  - Upgradable Storage Interface Module
  - Upgradable Electronics Interface Module
  - Exchangeable Lens Mount (ELM)
  - Easy and powerful free software updates
  - New features through purchase of license
- Long product cycles

We are open to equipment and standards from other manufacturers, be that PL mount lenses, Apple ProRes, the HD-SDI standard, Gold or V-mount on-board batteries, cmotion lens control systems or both 12 and 24V accessory power outputs. We want to make sure that you can put together the right ALEXA package with the accessories you want.

To ensure a smooth post production workflow, we are sharing our color science with post production equipment manufacturers through the ARRI Partner Program. Our ARRIRAW Software Development Kit (SDK) allows them to integrate the ARRI debayering algorithm or create their own, depending on what works best for them.

In addition, ALEXAs can be upgraded, as we have shown with the Plus upgrade, the Fiber Remote Option, the XR Module upgrade and as we are continuously showing with our free Software Upgrade Packets that provide new and exciting features like ProRes 2K/16:9* or ProRes 2K/4:3*. Further features like high speed or anamorphic de-squeeze are included in some cameras and can be purchased through software licenses for the others. All this, combined with our long product cycles, create a sustainable business model for all owners of ARRI cameras.

ALEXA XT CAMERAS

Second generation ALEXAs are called ALEXA XT cameras (Xtended Technology). They were released in 2013 and, in addition to all the features of the ALEXA Classic camera, they are equipped with the XR Module (Xtended Recording), internal ND filtration, a 4:3 Super 35 sensor, built-in CDL server and an LDS PL mount. In addition, they have a new viewfinder mounting bracket, include anamorphic de-squeeze and high speed licenses as well as a new, super silent fan. ALEXA XT cameras are the ALEXA XT, ALEXA XT M, ALEXA XT Plus and ALEXA XT Studio. The XR Module is on the left side of the camera. It has one slot for either an XR Capture Drive or an **SxS** Adapter that allows the use of one **SxS PRO** card.

- Faster, lighter and more affordable ARRIRAW recording
  - in-camera ARRIRAW recording up to 120 fps onto XR Capture Drives
  - onto fast, rugged and reliable 512 GB XR Capture Drives
  - proven, efficient and versatile Codex ARRIRAW workflow
- Faster and longer ProRes/DNxHD in-camera recording
  - ProRes (2) or DNxHD (1) up to 120 fps onto XR Capture Drives
  - in-camera ProRes or DNxHD up to 60 fps onto **SxS PRO** cards with **SxS** Adapter
  - ProRes 4:3 2K
  - proven, efficient and versatile ProRes/DNxHD workflow
- 4:3 Super 35 sensor
  - ideal for anamorphic lenses
  - increased post flexibility for spherical lenses
- Built-in ND filter option (3)
  - internal filter holder reduces weight, reflections and hassle
  - 8 full-spectrum neutral density (FSND) filters available from ND 0.3 to ND 2.4
  - neutral color balance at all densities
  - anti-reflective multi-coating maintains high contrast
  - precision polishing preserves image sharpness
- Included anamorphic de-squeeze and high speed licenses
- Built-in Lens Data System (LDS)

  - more efficient on-set and in post
  - Lens Data Archive (LDA) for use with non-LDS lenses
- Integrated CDL capture
  - stores ASC Color Decision List in ARRIRAW metadata
- Viewfinder Mounting Bracket VMB-3
  - improved operating comfort and flexibility
  - strong and rigid construction
  - special hard, low friction anodizing on all moving parts
  - 15 mm lightweight rods hold viewfinder mount
  - built-in bubble level
- Super silent ALEXA XT fan
- Quick switch BNC connectors
  - can be exchanged without camera disassembly

(1) DNxHD recording not possible with XT cameras and ALEXA Classic cameras with the XR Module upgrade as of SUP 8.0 (ALEXA XT/XR); planned for SUP 9.0 (ALEXA XT/XR). DNxHD is possible with ALEXA Classic cameras with SUP 7.x and SUP 8.x (ALEXA Classic).

(2) SUP 8.0 (ALEXA XT/XR) supports ARRIRAW 16:9 and ProRes 422 16:9 HD at up to 120 fps, ProRes 4444 16:9 HD up to 60 fps (with 64 GB **SxS PRO** cards). SUP 9.0 (XT/XR) is planned to support ProRes 4444 16:9 HD up to 120 fps (with XR Capture Drives)

(3) Only for ALEXA XT, ALEXA XT M and ALEXA XT Plus. ALEXA XT Studio has its own motorized ND filter solution.

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* ProRes 2K/16:9 and ARRIRAW output are not available on ALEXA HD and ALEXA HD Plus

** DNxHD recording not possible with XT cameras and ALEXA Classic cameras with the XR Module upgrade as of SUP 8.0 (ALEXA XT/XR); planned for SUP 9.0 (ALEXA XT/XR). DNxHD is possible with ALEXA Classic cameras with SUP 7.x and SUP 8.x (ALEXA Classic)

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4 Layout of the ALEXA

The following images show the ALEXA Classic with SxS module:

Figure 1: ALEXA right

Figure 2: ALEXA left

Figure 3: ALEXA top

Figure 4: ALEXA bottom

Figure 5: ALEXA front

Figure 6: ALEXA back

The following images show the ALEXA Classic upgraded with the XR module:

Figure 7: ALEXA right

Figure 8: ALEXA left

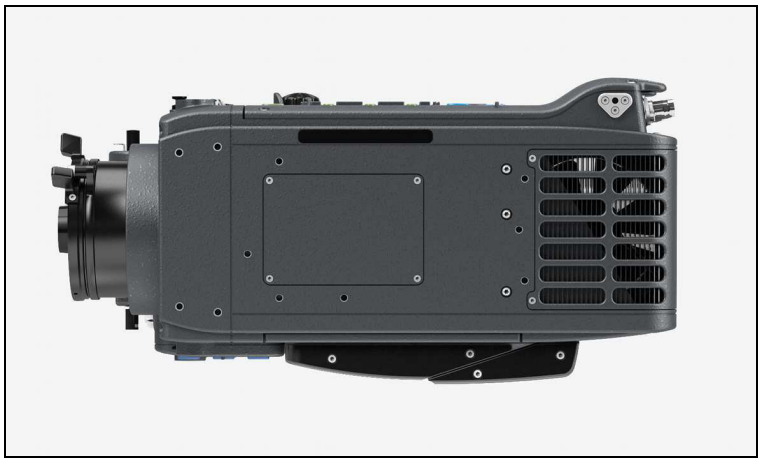

Figure 9: ALEXA top

Figure 10: ALEXA bottom

Figure 11: ALEXA front

Figure 12: ALEXA back

5 Safety Guidelines

Any violation of these safety instructions or non-observance of personal care could cause serious injuries (including death) to users and affiliates and damage to the equipment or other objects.

5.1 Explanation of Warning Signs and Indications

Indicates a possible risk of injury or damage to the equipment

Indicates the risk of electric shock or fire danger that could result in injury or damage to the equipment.

Note: Indicates further information or information from other instruction manuals

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5.2 General Safety Guidelines

- Always follow these guidelines to ensure against injury to yourself or others and damage to the system or other objects.
- This safety information is in addition to the product specific operating instructions in general and must be strictly observed for safety reasons.
- Read and understand all safety and operating instructions before you operate or install the system!
- Retain all safety and operating instructions for future reference.
- Heed all warnings on the system and in the safety and operating instructions before you operate or install the system. Follow all installation and operating instructions.
- Do not use accessories or attachments that are not recommended by ARRI, as they may cause hazards and invalidate the warranty!
- Do not attempt to repair any part of the system! Repairs must only be carried out by authorized ARRI Service Centers.

5.3 Specific Safety Instructions

- Do not remove any safety measures from the system!
- Do not operate the system in areas with humidity above operating levels or expose it to water or moisture!
- Do not cover the fan openings at the camera back top and bottom!
- Do not subject the system to severe shocks!
- Do not place the system on an unstable trolley/hand truck, stand, tripod, bracket, table or any other unstable support device! The system may fall, causing serious personal injury and damage to the system or other objects.
- Operate the system using only the type of power source indicated in the manual! Unplug the power cable by gripping the power plug, not the cable!
- Never insert objects of any kind into any part of the system if not clearly qualified for the task in the manual, as objects may touch dangerous voltage points or short out parts! This could cause fire or electrical shock.
- Unplug the system from the power outlet before opening any part of the system or before making any changes to the system, especially the attaching or removing of cables!
- Do not use solvents to clean!
- Do not remove any stickers or paint marked screws!
- Always place a lens or a protective cap in the lens mount receptacle!
- Never run a camera with a mirror shutter without a lens or a protective cap in the lens mount receptable!
- Changing camera lenses should be done in a dry and dust-free environment. If this is not possible, take extra care that no dust enters the camera while the lens is off!
- When no lens is attached to the camera, immediately place the protective on the lens mount to avoid contamination of the sensor cover glass!
- After changing lenses, always perform a dust check to make sure no dust has settled on the sensor cover glass!
- Clean optical lens surfaces only with a lens brush or a clean lens cloth. in cases of solid dirt or grease, moisten a lens cloth with pure alcohol. Discard contaminated lens cloth after use! Never attempt to clean a lens brush with your fingers!
- NEVER USE CANS WITH COMPRESSED AIR OR GAS TO BLOW OFF THE DUST! This can severely damage optical elements.

- If the sensor cover glass has been contaminated by solid dirt or grease, special optical cleaning kits should be used for dirt removal under very high care! If the contamination cannot be removed, the camera should be taken to an ARRI service center for cleaning.
- THE USE OF METHANOL TO CLEAN OPTICAL SURFACES IS NOT RECOMMENDED!
- NEVER USE ACETONE TO CLEAN OPTICAL SURFACES!
- NEVER TRY TO REMOVE THE SENSOR COVER GLASS!
- DO NOT POINT THE CAMERA INTO DIRECT SUNLIGHT, VERY BRIGHT LIGHT SOURCES, OR HIGH-ENERGY LIGHT SOURCES (e.g. laser beams)! This may cause permanent damage to the camera image sensor.
- DO NOT POINT THE VIEWFINDER INTO DIRECT SUNLIGHT, VERY BRIGHT LIGHT SOURCES, OR HIGH-ENERGY LIGHT SOURCES (e.g. laser beams)! This may cause permanent damage to the viewfinder display and optical elements.

6 General Precautions

6.1 Storage and Transport

- Use a lens port cap to prevent damage to the sensor cover glass and sensor whenever there is no lens attached.
- Unplug all cables when transporting the Alexa in a camera case.
- Do not store the camera in places where it may be subject to temperature extremes, direct sunlight, high humidity, severe vibration, or strong magnetic fields.

6.2 Electromagnetic Interference

ALEXA meets EC regulations by fulfilling the specifications of the European Directive 2004/108/EC (15th December 2004).

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Complies with the canadian ICES-003 Class A specifications. Cet appareil numérique de la Classe A est conformé à la norme NMB-003 du Canada.

This device complies with RSS 210 of Industry Canada. This Class A device meets all the requirements of the Canadian interference-causing equipment regulation. Cet appareil numérique de la Class A respecte toutes les exigences du Réglement sur le matérial brouilleur du Canada.

6.3 Condensation

When moving the camera from a cool to a warm location or when the camera is used in a damp environment, condensation may form inside the lens port, on the sensor cover glass, between the sensor and the sensor cover glass, and on internal or external electrical connections.

- Operating the camera while condensation is present may result in personal injury or damage to the equipment.

Condensation on the optical components may have a visible effect on the output images. To reduce the risk of condensation:

- Find a warmer storage location.
- Attach the ARRI air-drying cartridge (silica bottle) to the PL-Mount of the camera during storage
- Note: Do NOT leave the air-drying cartridge attached to the PL-Mount during transportation of the camera!
- If camera needs to be stored in a place that is considerably cooler than the location where it will be used, consider keeping the camera powered from a mains unit in addition to using the air-drying cartridge.
- In ambient temperatures above 30°C/86°F and/or humidity above 60%, always attach the air-drying cartridge to the PL-Mount of the camera when not in use. This not only applies to storage, but also to shooting breaks and situations when the camera remains without an attached lens for an extended time.
- MAKE SURE THE SILICA BOTTLE IS SECURELY FASTENED. UNDER NO CIRCUMSTANCES SPILL SILICA INTO THE LENS PORT!

7 Power Supply

- Use only ARRI-recommended power supply solutions.
- Manipulation of power supplies could result in serious injury or death, or damage to the ALEXA.

The ALEXA accepts an input voltage range from 10.5 to 34 V DC. The camera can be powered through the BAT connector or battery adapters accepting V-Lock or Gold Mount batteries.

The power supply should deliver an output of more than 90 W to power the camera sufficiently. The power draw of the camera in basic configuration is about 85 W.

A 12 to 15 V battery should have at least 6 A maximum output current.

Note: when powering accessories through the camera, the total power draw of the camera is increased by the amount of power drawn by the accessories.

7.1 Power Management

When using the BAT connector and one or more onboard battery adapters simultaneously, the camera's power management system ensures that the power source with the highest voltage level is used. When the voltage level of one power source drops below the level of the other, or a power source is disconnected from the camera, the power management system automatically switches to the other power source, avoiding shutdown of the camera.

For example, a 12 V onboard battery can be used as backup for the main 24 V battery. Using a 12 V onboard battery in addition to the main 24 V battery also allows for quick switchover to handheld mode—the power cable can simply be disconnected from the BAT connector.

When using two onboard battery adapters (with batteries in parallel—one on top and one on the back), the camera will treat them as a single source. When used this way, the load is spread across two batteries, creating a strong power source.

7.2 BAT Connector

The BAT connector is the primary power input on the ALEXA. It is a Fischer 2-pin socket located at the back of the camera on the camera-right side.

The socket accepts power cables KC-20S and KC-29S. The cables can either be connected to the mains unit NG 12/26R or to 24 V cine-style batteries with three-pin XLR outputs.

Figure 13: BAT connector

7.3 Mains Unit NG 12/26 R

Use of the mains unit is recommended for shooting in the studio and when using electronic accessories with high power consumption.

To power the ALEXA using the Mains Unit NG 12/26 R:

1. Set the correct mains voltage on the mains unit using the fuse on the back of the unit. For example, set it to 220 V if the AC mains power source is 220 V.
2. Connect the mains unit to AC mains power.
3. Ensure that the camera power is turned off.
4. Set the voltage switch on the mains unit to 26 V.
5. Connect the battery cable KC-20S or KC-29S (spiral cable) to the power supply socket on the camera and the 26 V socket on the mains unit.

Note: The NG 12/24 R was the original design that provided 12 & 24 volts output – it was superseded by the NG 12/26 R, which outputs 12 & 26 volts. The NG 12/24 R can easily be upgraded to NG 12/26 R specification at an ARRI service center.

7.4 Cine-Style Batteries

Any 24 V cine-style battery with a three-pin XLR output can be used to power the camera through a KC-20S or a KC-29S.

The Anton/Bauer CINE VCLX/2 battery (280 Wh) with charger is available from ARRI.

To connect the battery to the camera:

1. Ensure that the main switch on the camera is off.
2. Connect the battery cable KC-20S or KC-29S (spiral cable) to the power supply socket on the camera and the 28V output on the battery.

Note: When the battery voltage drops below the warning level, the **BAT1** level in the camera display will start flashing. A white i will appear, signaling more information is available on the **INFO** screen. For more information on setting the low battery warning level, see *Menu>System>Power* (on page 118).

To charge the battery

1. Connect the charger to AC mains power.
2. Plug the charger cable into the charge input socket of the battery.
3. Charge the battery until complete. Fully charged batteries can be left connected to the charger until required for shooting.

Note: For more information, refer to the Anton/Bauer CINE VCLX/2 manual.

7.5 Onboard Batteries

The camera can be equipped with adapters for either V-Lock or Gold Mount video-style batteries. When a battery equipped with the TI-protocol for battery communication is used, the ALEXA will display remaining capacity as a percentage on the Home screen. For these batteries, the user does not need to set the battery warning level.

Four different adapters are available:

- BAB-G: Battery Adapter Back for Gold Mount batteries
- BAB-V: Battery Adapter Back for V-Lock batteries
- BAT-G: Battery Adapter Top for Gold Mount batteries
- BAT-V: Battery Adapter Top for V-Lock batteries

Note: Adapters must be installed by a trained technician!

7.5.1 V-Lock Batteries

V-Lock batteries from different manufacturers may be used on the ALEXA. When batteries from manufacturers such as ID-X and Bebop, are used, their remaining capacity will be displayed as a percentage on the Home screen.

To attach a V-Lock battery:

1. Align the v-shaped wedge on the battery with the v-shaped notch on the battery plate.
2. Press the battery downwards until you hear a click.
3. Check that the battery is securely mounted on the battery plate.

To release a V-Lock battery:

1. Press the release button on the camera-left side or top of the battery (manufacturer dependent).
2. While pressing the release button, slide the battery upwards.

Figure 14: ALEXA with BAB-V and V-Mount battery

Note: Not all V-Lock batteries deliver enough power to supply the camera. Use only batteries with a capacity of 90 Wh or more to prevent damage to the battery and unpredictable camera behavior. Any camera-battery combination should be tested prior to use, especially when accessories are powered through the camera.

7.5.2 Gold Mount Batteries

If the ALEXA is equipped with a Gold Mount, Anton/Bauer batteries can be used. Their remaining capacity will be displayed as a percentage on the Home screen.

To attach a Gold Mount battery:

1. Align the three pins on the back of the battery to the three corresponding holes on the battery plate.
2. Press the battery to camera-right until you hear a click.
3. Check that the battery is securely mounted on the battery plate.

To release a Gold Mount battery:

1. Press the release button on the camera-left side of the battery plate.
2. While pressing the release button, slide the battery camera-left, and pull it straight out.

Figure 15: Camera with BAB-G and a Gold Mount battery

Note: Not all Gold Mount batteries deliver enough power to supply the camera. Use only batteries with a capacity of 90 Wh or more to prevent damage to the battery and unpredictable camera behavior. Any camera-battery combination should be tested prior to use, especially when accessories are powered through the camera.

7.6 Power Outputs

The ALEXA, ALEXA M, ALEXA XT, ALEXA HD and ALEXA XT M have two 24 V power outputs and one 12 V power output for accessories. ALEXA Plus, ALEXA Plus 4:3, ALEXA HD Plus, ALEXA XT Plus, ALEXA Studio and ALEXA XT Studio models have three 24 V power outputs and one 12V power output.

Figure 16: 24 V outputs (RS) and 12 V output

7.6.1 Powering 12 V Accessories

One 12 V output with a 2-pin LEMO connector is located on the right side of the camera. It is limited to 12 V and can supply a device with a current of up to 2.2 A, depending on the camera power supply.

7.6.2 Powering 24 V Accessories

Two 24 V remote start/stop (RS) outputs with 3-pin Fischer connectors are located on the right side of the camera. They can supply two devices with a combined load of up to 2.2 A (shared with the EXT connector power out), depending on the camera power supply. When the camera is powered from a source with a voltage below 24 V, they output 24 V. If the camera's power source supplies more than 24 V, this voltage level is also present on the RS outputs.

Besides powering accessories, the RS outputs can also be used to send a remote start/stop signal to the camera.

8 Camera Support

8.1 Minimum Equipment Recommended For Operation

- ARRI ALEXA camera body including SxS module or XR module and Lens Adapter PL mount without LDS (LA-PL-1)
- Electronic Viewfinder EVF-1
- Viewfinder Mounting Bracket
- KC 150-S Viewfinder Cable short 0.35m/1.2ft
- CCH-1 Center Camera Handle
- BP-12 Bridge Plate with base plate, or BPA-1 with BP-5/BP-8 Bridge Plate and base plate, or WA-1 Wedge Adapter and Quick Release HD Baseplate
- SD card
- Compatible power supply
- Suitable media for recording

8.2 Tripod and Remote Heads

Tripod and remote heads must have adequate load ratings to support the ALEXA and attached accessories. See the following table for camera and component weights.

Note: Always check the payload limits of a remote head and crane before mounting a camera.

In applications where the camera mount is subject to high forces (e.g. car or helicopter mounts) the camera must be additionally secured with appropriate safety restraints. All mount screws must be tightened firmly with an appropriate screwdriver (not with the commonly used coin!).

Camera weight	**lb**	**kg**
ALEXA camera body weight with **SxS** module	13.8	6.3
ALEXA camera setup weight with **SxS** module (incl. EVF-1, VMB-1, CCH-1, KC-150S)	16.9	7.7
ALEXA camera body weight with XR module	14.5	6.6

ALEXA camera setup weight with XR module (incl. EVF-1, VMB-1, CCH-1, KC-150S)	17.6	8.0

8.3 Electronic Viewfinder EVF-1

The electronic viewfinder EVF-1 employs a liquid crystal on silicon (LCOS) imaging device with a temperature-stabilized LED light source to provide a bright, accurate view of the sensor image in all operating conditions. Each EVF-1 is calibrated to precisely match the image on the ALEXA's HD outputs.

The EVF-1 has a resolution of 1280x720 pixels, with 32 additional lines of resolution above and 32 below the image to display camera status information. The EVF-1 can also display a 10% surround view area of the sensor to help the operator track unwanted elements before they enter the recorded image area. Focus can be checked by temporarily zooming into the image with a magnification factor of 2.25x. The low-latency interface of the EVF-1 has a delay of less than 1 frame.

The EVF-1 has button controls for false color check and zoom, as well as buttons and a jogwheel to control EVF and camera settings.

Connect the viewfinder to the camera using the viewfinder mounting bracket.

Figure 17: ALEXA with XR module and EVF-1

Note: Do not point the viewfinder eyepiece at direct sunlight or bright light sources, as this could damage the LCOS imaging device. If possible, cover the eyepiece when not in use to prevent any damage.

8.3.1 Viewfinder Cables

The viewfinder cables are unidirectional with a male plug to connect to the camera and a female plug to connect to the viewfinder.

Cables are available in the following lengths:

Model	Length (m / ft)	Suggested use
KC-150-S	0.35 / 1.2	For use of EVF-1 on camera left side in handheld mode
KC-151-S	0.65 / 2.1	For use of EVF-1 on camera right side or when using Viewfinder Extension Bracket VEB-1
KC-152-S	2.00 / 6.6	Longest possible length for use with specialty rigs

Figure 18: EVF cables: KC-150S (center), KC-151S (middle), KC-152S (outer)

8.3.2 Viewfinder Mounting Bracket

The Viewfinder Mounting Bracket VMB-3 is attached to the camera using two captive 3mm hex socket head screws on top of the camera at the front. The VMB-3 features a leveling bubble and two internally threaded 15mm rods with standard 60mm distance. These can be extended with standard 15mm rods for mounting matte boxes, lens motors and the like above the lens if need be.

Attach the EVF-1 to the Viewfinder Mounting Bracket by sliding the dove tail into the receptacle and closing the lever on the EVF-1.

The position of the EVF-1 can be adjusted by loosening the levers on the Viewfinder Mounting Bracket, adjusting the position as desired and closing the levers to retighten.

The EVF-1 can be mounted on the camera-right side by unscrewing the threaded end cap on the side-to-side adjustment rod, removing the rod itself and inserting it from the other side. Remember to reattach the threaded end cap.

Note: Camera-right operation is not possible with the standard EVF cable KC-150-S. Instead, the longer cable KC-151-S is needed.

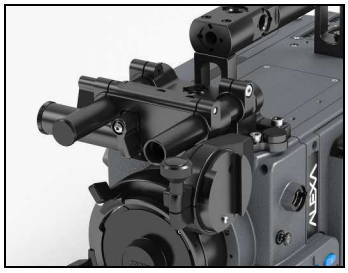


Figure 19: VMB-3 on camera

The Viewfinder Extension Bracket VEB-3 extends the mounting point of the EVF-1 further back. It can be attached to a tripod head for use with geared heads or greater comfort when using fluid heads using its standard attachment point for the ARRI Eyepiece Leveler EL-3. The VEB-3 has been improved over the VEB-1 in the following aspects:

- The redesigned shape provides greater sturdiness at a lighter weight.
- The blue security pin at the VMB-3 connecting end prevents the VEB-3 from accidently dropping out when it is released.
- The connection part to the Eyepiece Leveler EL-3 is spring loaded so that it automatically moves away from the camera body when it is not in use.
- The VEB-3 features a fold-out arm that can be used to rest the VEB-3 on the camera body when moving the camera.

To avoid damage to the VMB-3 when using the VEB-3 with an eyepiece leveler, loosen the friction on VMB-3's rotating assembly.

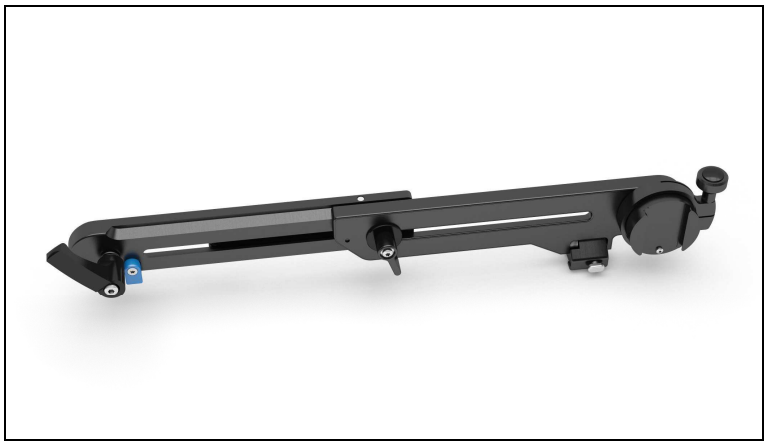


Figure 20: VEB-3 with closed fold-out arm

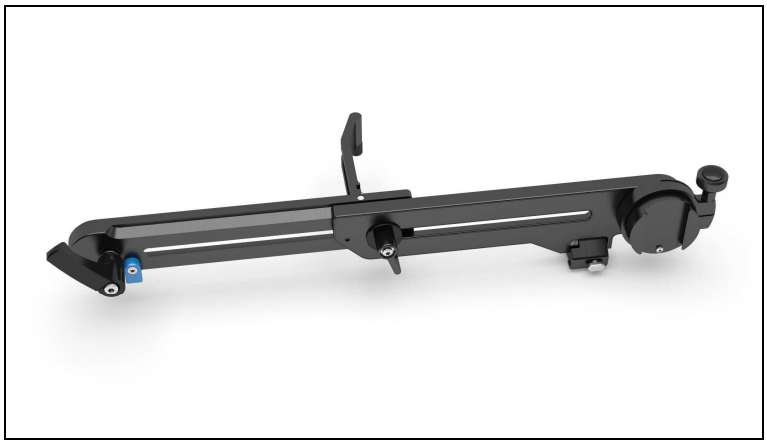


Figure 21: VEB-3 with opened fold-out arm

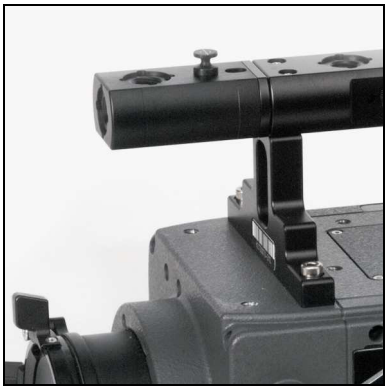
Figure 22: ALEXA with EVF-1, VEB-3 and cable KC-151S

8.4 Center Camera Handle CCH-1

The Center Camera Handle CCH-1 is attached to the camera top with three captive 3mm hex socket head screws (two at the front and one at the back). Ensure that the CCH-1 is securely fastened before attempting to lift the camera from it.

Figure 23: Camera with CCH-1, side view

The Handle Extension Block HEB-2 mounts to the front end of the CCH-1 and adds one more focus hook to the camera in a high position, allowing the tape measure to clear the matte box.



8.5 Side Camera Handle SCH-1

The Side Camera Handle SCH-1 is used in conjunction with a BAT-V or BAT-G top-mounting battery adapter, or with third-party onboard recorders. It is attached to the camera using three captive 3mm hex socket head screws (two at the front and one at the back). Ensure that the SCH-1 is securely fastened before attempting to lift the camera from it.

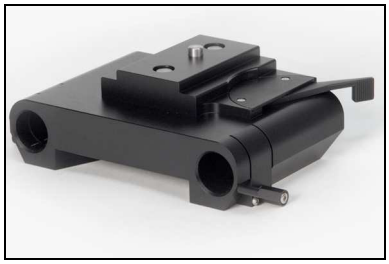
If a tall battery or a tall third-party onboard recorder is used, the adjustable center grip of the SCH-1 can be replaced by the taller Adjustable Center Grip Tall (ACG-2).

Figure 24: SCH-1

Figure 25: Camera with SCH-1, side view

8.6 Bridge Plates BP-12/BP-13

The bridge plate BP-12 for 19 mm studio rods has been newly developed for ALEXA. It mounts directly to the camera body using two 3/8"/16 screws and ensures that support rods, matte boxes and follow focus units are positioned properly in regards to the optical center of the camera, just like all other ARRI cameras.



The bridge plate BP-13 is equivalent to the BP-12, but for 15 mm studio rods.

Note: Make sure bridge plates are tightened firmly with a screwdriver, not the commonly used coin!

8.7 Bridge Plate adapter BPA-1

The bridge plate adapter BPA-1 can be used to attach a BP-3/BP-5/BP-8/BP-9 to ALEXA. First attach the BPA-1 to the camera with the two screws. Then attach the bridge plate to the adaptor with its two screws. Make sure the screws are tightened firmly with a screwdriver.

8.8 Wedge Adapter WA-1 and Quick-Release Plate QR-HD-1

The WA-1 can be mounted at the same position as a bridge plate. It has a dove tail that slides into the counter part of a quick-release plate, like the ARRI QR-HD-1. The quick-release plate has a pin at its back, which fits into the pin receptacle at the back of the camera base.

Figure 26: ARRI QR-HD-1

8.9 Leveling Block LB-1

The Leveling Block LB-1 attaches to the bottom of the ALEXA in the pin receptacle on the back foot. It prevents the camera from resting on a rear-mounted battery when a bridge plate is attached and the camera is placed on a flat surface.

Attach the LB-1 by inserting its pin into the pin receptacle at the end of the shoulder arc in the camera base. Twist the knob clockwise to tighten.

Figure 27: Leveling Block LB-1

8.10 Shoulder Pad SP-3

The camera base has an integrated arch to fit to the operator's shoulder. For extended handheld shots, the newly designed shoulder pad SP-3 can be attached to the base of the camera with velcro.

Note: The SP-3 can only be used with a BP-12 and 19 mm rods or with 15 mm rods and a Wedge Adapter WA-1 and a Quick-Release Plate QR-HD-1 . When using the BPA-1 with a BP-5/BP-8, the bridge plate has to be removed prior to attaching the SP-3.

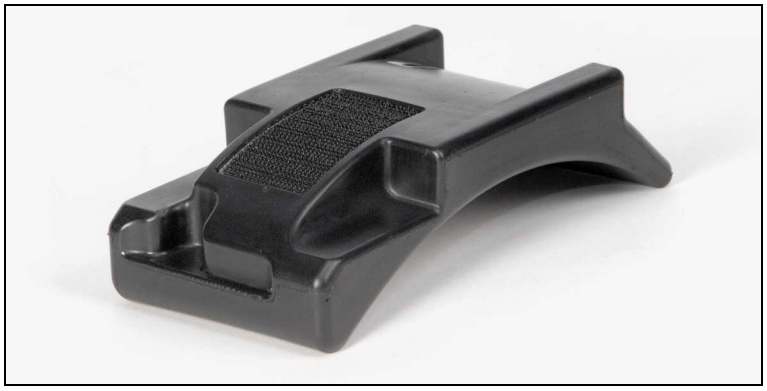


Figure 28: SP-3 shoulder pad

Figure 29: SP-3 below camera

9 Connectors

Camera back

Figure 30: Connectors at back

From top to bottom: MON OUT, RET/SYNC IN, EXT, REC OUT 1, REC OUT 2, BAT, ETHERNET

Camera right

Figure 31: Connectors on right side

From left to right, top to bottom: 2x RS (24 V) out, AUDIO OUT, TC, 12V out, AUDIO IN, SD CARD (camera bottom)

Camera left

For ALEXAs with SxS module:

Figure 32: SxS module

For ALEXAs with XR module:

Figure 33: XR module

Camera front

Figure 34: Camera front

EVF connector

9.1 BAT

The BAT connector can be used to power the camera from an external power source with cables KC-20S and KC-29S.

It is located at the back of the camera on the camera-right side.

9.2 REC OUT 1 + 2

The REC OUT consists of two BNC connectors capable of carrying 1920x1080 1.5G or 3G HD-SDI signals with frame rates from 23.976 to 60 fps according to SMPTE standards 274M, 292M, 372M and 425M (Level B). RGB 444 at frame rates of 48, 50, 59.94 and 60 fps is output in a proprietary format utilizing two 3G connections. ALEXAs with **SxS** module can also output ARRIRAW in a proprietary format (ARRIRAW T-Link) that is supported by a range of third-party recorders (not on ALEXA HD and ALEXA HD Plus). The signal format can be changed in the **Recording** menu.

The connectors are located at the back of the camera on the camera-right side.

9.3 RET/SYNC IN

A return signal from another image source can be fed into the ALEXA's RET connector for displaying on EVF and/or MON OUT. The signal must be a 1920x1080 422 1.5G single link according to SMPTE 274M and 292M. The output routing of the RET in signal can be set in the Monitoring menu.

The connector is located at the back of the camera on the camera-right side.

9.4 MON OUT

The MON OUT is a single BNC connector capable of carrying a 1920x1080 422 YCbCr 1.5G HD-SDI signal with frame rates of 23.976, 24, 25, 29.97 or 30 fps according to SMPTE standards 274M and 292M. The signal format can be changed in the Monitoring menu.

The connector is located at the back of the camera on the camera-right side.

9.5 EXT

The EXT connector is a multi-pin accessory connector that carries signals for communication with various accessories and 24V power. The maximum power output is 2.2A, shared with the RS outputs.

Cables are currently available for:

- Connecting a UMC-3 remote motor controller

(model UMC Connection Cable (0.80m/2.6ft) K-UMC3-ALEXA)

- Connecting two ALEXA cameras for synchronized operation (model EXT to EXT Cable (2.00m/6.6ft) KC 155-S)

The connector is located at the back of the camera on the camera-right side.

9.6 ETHERNET

Standard Ethernet connectors can deliver neither the power nor the durability and reliability required by ARRI, so the ALEXA uses a specially designed 10-pin LEMO connector. The ARRI KC-153-S cable is required to connect the Ethernet socket to a standard RJ-45 Ethernet port.

The Ethernet port can be used to operate two ALEXA cameras with synced settings by connecting the cameras with a KC 156-S cable, or to connect the Remote Control Unit RCU-4 to the camera.

The Ethernet connector can output 24 V with 1.2 A power.

The connector is located at the back of the camera on the camera-right side.

9.7 EVF

The EVF connector connects the camera to an EVF-1 electronic viewfinder. The signals on this connector are proprietary and can only be used to drive an EVF-1. This proprietary signal assures low latency for the viewfinder image.

The connector is located at the front of the camera on the camera-left side.

9.8 AUDIO IN

2-channel analog line-level audio can be fed to the camera via the 5-pin XLR connector located at the front of the camera on the camera-right side.

The ALEXA converts the audio signal from analog to 24 bit 48 kHz PCM.

9.9 RS

The two RS connectors supply external accessories with at least 24 V power and a combined load of up to 2.2 A (shared with the EXT connector power out). The sockets also accept an ARRI remote start/stop trigger.

The connectors are located at the front of the camera on the camera-right side.

9.10 12 V

The 12 V connector supplies an external accessory with 12 V power and up to 2.2 A current.

The connector is located at front of the camera on the camera-right side.

9.11 TC

The TC connector is a 5pin LEMO socket. It accepts and distributes a Longitudinal Time Code (LTC) signal.

It can be used to

- jam-sync the ALEXA's time code to a Clockit, TC Slate or another camera
- transmit the ALEXA's time code to a Clockit, TC Slate or another camera
- tune the frequency of the ALEXA’s crystal oscillator with an Ambient ACC Clockit Controller

The connector is located at the front of the camera on the camera-right side.

9.12 AUDIO OUT

The AUDIO OUT is a 3.5mm TRS connector (headphone jack), which outputs audio fed to the 5-pin XLR AUDIO IN connector with a maximum power of 2.5 dBm.

The connector is located at the front of the camera on the camera-right side.

Note: Connecting headphones to the camera while recording can cause a short audio signal interruption due to static electricity.

9.13 SD Card

The ALEXA saves data such as user setups, frame grabs and system logs to an SD card. Firmware, additional frame lines and ARRI Look Files are loaded onto the camera from the SD card. The SD card slot is located on the bottom of the camera on the camera-right side. To access the SD card slot, slide the door towards the front of the camera.

SD Card Requirements

- SD or SDHC card (most brands are compatible)
- maximum capacity of 4GB
- FAT or FAT32 format

Note: Keep the SD card slot door closed to prevent dirt and moisture from entering the camera.

The SD card can be formatted on the ALEXA or the following folder structure can be created manually on a computer. The SD card must be properly formatted prior to its first use.

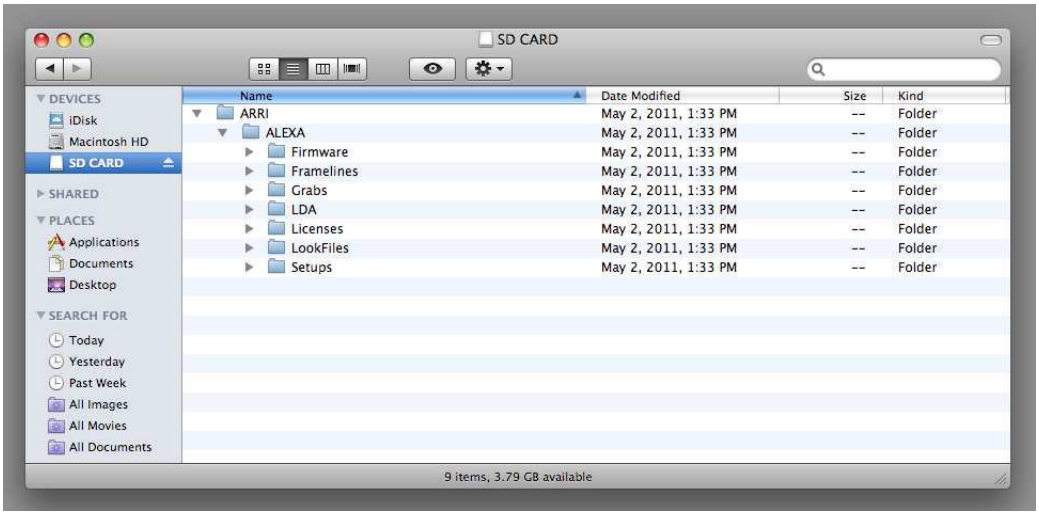


Figure 35: Folder structure required for SD card

To format an SD card on the ALEXA:

1. Press the **MENU** button.
2. Using the jogwheel, select System.
3. Select SD Card.
4. Select Format + prepare SD card.
5. Press both **FORMAT** buttons simultaneously. The ALEXA will create the required folder structure on the SD card after formatting.

Note: Formatting the SD card will irreversibly remove all data on the SD card.

To create the required folder structure on the SD card in the ALEXA without formatting:

1. Press the **MENU** button.
2. Using the jogwheel, select System.
3. Select SD Card.
4. Select Prepare SD card. The ALEXA will create the required folder structure on the SD card without formatting or deleting any data.

Note: Firmware update files are recognized by the camera anywhere within the structure, but it is recommended to copy them into the Firmware folder.

9.14 SxS Slots

This section is only relevant for ALEXAs with SxS module.

The ALEXA records clips using the **SxS** module on the camera-left side. The two **SxS** card slots can be accessed by opening the **SxS** door towards the camera body. The **SxS** door was designed for accessibility when the ALEXA is operated in confined spaces or mounted on rigs such as remote heads.

Note: Keep the **SxS** slot door closed to prevent dirt and moisture from entering the camera.

To load an SxS card:

1. Insert the **SxS PRO** card into the **SxS** slot with the contacts facing the front of the camera and the label facing out (away from the camera body).
2. Push the card in against the spring until the lock engages.
3. Close the **SxS** door.

Note: Do not force an **SxS PRO** card into the slot backwards or with the label-side in—the contacts in the **SxS** module and the **SxS PRO** card could be damaged.

Note: Do not force the **SxS** door closed if the **SxS PRO** card is not fully inserted and the lock engaged.

To release an SxS card:

- Push the **SxS PRO** card in until the lock disengages, taking care to prevent the card from dropping out of the **SxS** slot.

SxS PRO cards do not have to be mounted or unmounted—they can be inserted or removed whenever the camera is not recording to the **SxS** module. If a card is removed during recording, only the last second of the current clip will be lost. All clips on the card will remain accessible and the card will remain fully functional.

Note: If the recording process is interrupted by power loss or card removal, transfer all the data from the **SxS PRO** card and format it before using it again.

To toggle between SxS slots:

- With the **SxS** door open, press the metal card select button located between the **SxS** slots. The active **SxS** slot is indicated by the LED in the **SxS** window.

Explanation of SxS LED States

Each card has an LED that signals the **SxS PRO** card's state to the user.

LED state	Card state
Off	No card present Card is unreadable (e.g. wrong file system) Card is inactive
Solid green	Card is selected and ready
Solid red	Card is accessed (read/write) *DO NOT REMOVE THE CARD!*

Note: Only Sony **SxS PRO** cards can be used with ALEXA. Sony **SxS-1** cards are not supported.

9.15 XR (Xtended Recording) Module

This section only applies to ALEXAs with XR module.

Figure 36: XR module

The ALEXA records clips using the XR (Xtended Recording) module on the camera-left side. The media slot can take XR Capture Drives or **SxS PRO** cards with an **SxS** adapter.

When the ALEXA is in ProRes mode, it can record onto **SxS PRO** cards and XR Capture Drives. They do not need to be loaded or unloaded, but can be used directly after insertion and can be safely removed whenever they are in standby.

When the ALEXA is in ARRIRAW mode, it can only record onto XR Capture Drives, which need to be loaded after insertion and unloaded prior to removal. Refer to the respective sections below for more information.

To access the media slot, slide the OPEN slider towards camera back so that the spring-loaded door jumps open.

Putting the lock slider in the (lower) lock position prevents accidential opening of the door. Ensure that the lock slider is in the (upper) unlocked position before attempting to open the door.

Note: Keep the door closed to prevent dirt and moisture from entering the camera.

Note: Only Sony **SxS PRO** cards can be used with ALEXA. Sony **SxS-1** cards are not supported.

Inserting media:

To load an XR Capture Drive:

1. Insert the XR Capture Drive into the media slot with the contacts facing the front of the camera and the ribbed side facing out (away from the camera body).
2. Push the XR Capture Drive towards camera front until the lock engages.
3. Close the door.

When the camera is in ARRIRAW mode, it automatically loads the XR Capture Drive when the door has been closed, see "Explanation of LED States" below. If closing the door is not possible, e. g. because it has been damaged, loading an XR Capture Drive can also be triggered by pressing and holding the eject button for about five seconds.

Loading an XR Capture Drive in ARRIRAW mode normally only takes a few seconds. In certain situations, however, it may take up to 30 seconds, especially when an XR Capture Drive has been removed previously without unloading it properly.

Note: Do not put any labels or adhesive tape on the back of an XR Capture Drive (the side facing the camera body). The XR Capture Drive must have full contact to the camera body to ensure proper heat conduction.

To insert an **SxS** adapter:

1. Insert the **SxS** adapter into the media slot with the contacts facing the front of the camera and the aperture facing out (away from the camera body).
2. Push the securing levers on top and bottom of the adapter and push it towards camera front until the lock engages.

To load an **SxS PRO** card:

1. Insert the **SxS PRO** card into the **SxS** adapter with the contacts facing the front of the camera and the label facing out (away from the camera body).
2. Push the card in against the spring until the lock engages.
3. Close the door.

Note: Do not force any media into the slot or into the adapter in wrong orientation—the contacts could be damaged.

Note: Do not force the door closed if the media is not fully inserted.

Removing media:

When the camera is in ProRes recording mode, **SxS PRO** cards and XR Capture Drives do not have to be mounted or unmounted—they can be inserted or removed whenever the camera is not recording. If media is removed during recording, only the last second of the current clip will be lost. All clips on the media will remain accessible.

When the camera is in ARRIRAW recording mode, XR Capture Drives need to be unloaded before they can be safely removed. Unloading is triggered automatically when the door is opened and the XR Capture Drive is in standby. When the door is already open, but the XR Capture Drive is still loaded, press the eject button on the XR Capture Drive to trigger unloading. See "Explanation of LED States" below for information about how the camera signals loading state.

Note: If the recording process is interrupted by power loss or media removal, transfer all the data from the media and format it before using it again.

Before removing any media, open the door by sliding the OPEN slider towards camera back. Ensure the lock slider is in the (upper) unlocked position, otherwise the OPEN slider will be blocked.

To remove an XR Capture Drive:

- Carefully pull the XR Capture Drive towards camera back, taking care not to drop it accidentally.

To remove an **SxS PRO** card:

- Push the **SxS PRO** card in until the lock disengages, taking care to prevent the card from dropping out of the **SxS** adapter.

To remove an **SxS** adapter:

- Push the securing levers on top and bottom of the **SxS** adapter and pull it towards camera back, taking care not to drop it accidentally.

It is possible that XR Capture Drives will get hot to the touch during extended operation and can cause pain or even burns if held for too long. It is advisable to handle the drive for no more than three seconds, and to remove the drive quickly and carefully. Allow it to cool before further handling and consider wearing protective gloves.

Explanation of LED States

XR Capture Drives and **SxS** adapters have an LED that signals the media's state to the user.

LED state	Card state
Off	• No media present • Media is unreadable (e.g. wrong file system) • Media is inactive
Solid green	Media is standby and ready

Solid red	Media is being accessed (read/write) *DO NOT REMOVE THE CARD!*
Red flashing	Media error, see camera for details
Blue flashing (XR Capture Drive only)	XR Capture Drive is being loaded or unloaded
Solid blue (XR Capture Drive only)	XR Capture Drive is unloaded and can be ejected safely

10 Lens Mounting

The ALEXA is equipped with an interchangeable lens mount.

Note: Lenses must cover an image circle of at least 30 mm in diameter to prevent vignetting.

10.1 Lens Adapter PL Mount LA-PL-1 (no LDS)

The Lens Adapter LA-PL-1 is the standard lens mount delivered with the ALEXA. It can be used to attach any modern PL-mount lens to the camera.

To mount a PL-mount lens:

1. Turn the bayonet ring anti-clockwise until it stops.
2. Remove the lens port cap.
3. Carefully insert the lens into the lens port. Align the notch in the lens flange with the index pin on the mount, keeping the lens rotated into a position where the lens markings are visible from either side of the camera.
4. Press the lens flange flat onto the lens mount.
5. Turn the bayonet ring clockwise until the lens is locked securely.
6. Ensure that the lens is properly mounted.

Note: When no lens is attached to the camera, use the lens port cap to prevent dust from entering the lens cavity.

Note: The sophisticated design principle of the camera's optical module delivers outstanding images with a cinematic look and feel, but also makes the imager sensitive to contamination. Dust particles that have settled on the sensor cover glass during a lens change may become visible as dark spots in the output image, similar to lint leaving marks on exposed film. The degree of this effect depends on the aperture of the lens.

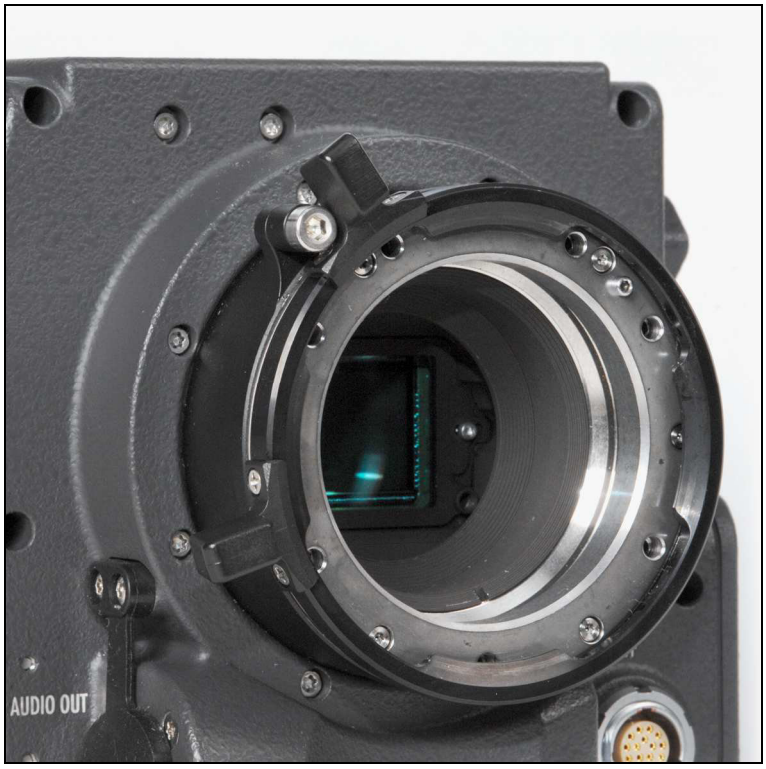


Figure 37: PL mount LA-PL-1 with index pin

10.2 Lens Support

Heavy lenses may require additional lens support. Using a lens support guarantees that the weight of the lens will not influence the flange focal depth and reduces stress on the lens mount.

To support a lens use 15mm studio or 19mm studio rods and an appropriate lens bridge. 15mm studio rods require a bridge-plate with 15mm studio rod support, such as a BP-3/BP-9 + BPA-1, while 19mm studio rods require a bridge-plate with 19mm studio rod support, such as a BP-12 or BP-5/BP-8 + BPA-1.

Mount the lens bridge LS-10 for 15 mm studio rods by pushing it onto the rods from the front. Mount the lens bridge LS-9 for 19 mm studio rods by clipping it on the rods from the top.

Slide the bridge into position on the rods directly under the lens support ring on the lens, and fix it in place by tightening the lever on its side. Align and tighten the center screw in the lens support ring, adjusting the height of the center screw with the lever on the back of the lens bridge.

Figure 38: ALEXA with BP-12, 19mm studio rods and lens bridge

11 Camera Controls

The ALEXA can be controlled through three user interfaces:

Main controls	Location: camera-right side Interface: 3-inch LCD-screen with floating-function buttons, a jogwheel to navigate through menus and adjust parameters, and a range of fixed-function buttons.
Operator controls	Location: camera-left side Interface: three assignable function buttons plus three fixed-function buttons for easy operator access.
EVF controls	Location: Electronic Viewfinder EVF-1 Interface: fixed function buttons and a jogwheel for adjustment of viewfinder parameters and primary shooting parameters.

11.1 Main Controls

The main controls can be used to set all camera parameters.

Figure 39: Main controls

11.1.1 Display

The 3-inch LCD has a resolution of 400x240 pixels. The back-lit, transflective display has exceptional contrast even in bright sunlight.

To adjust the LCD brightness:

- On the HOME screen, rotate the jogwheel while pressing the **BACK** button.

A removable plastic shield protects the display from scratches. It can be removed by pulling it off the four pins.

11.1.2 Screen Buttons

Six screen buttons are located above and below the LCD display. Their function varies depending on the screen content and is shown directly above or below each button. If no function is shown above or below a button on the LCD, it has no function for that screen.

As a failsafe, operations that cannot be reversed and can result in the loss of data require pressing two buttons simultaneously to confirm the operation.

11.1.3 HOME screen

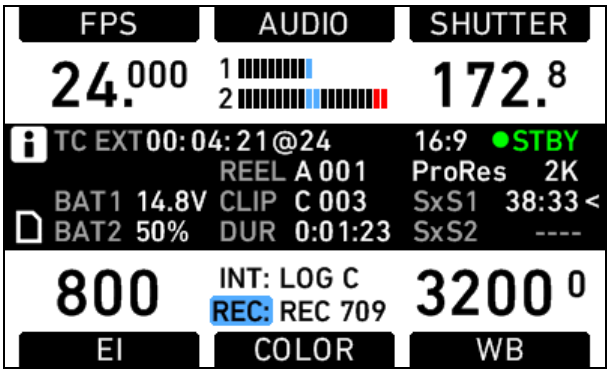


Figure 40: HOME screen with SxS module

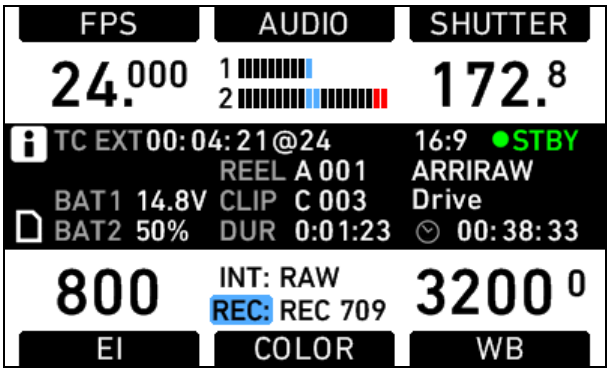


Figure 41: HOME screen with XR module

The HOME screen is the ALEXA's default screen. It shows the most important camera parameters and gives quick access to changing them through the screen buttons. To return to the HOME screen from any menu in the camera, press the **HOME** button.

Note: To adjust the LCD brightness from the HOME screen, rotate the jogwheel while pressing the **BACK** button.

Screen buttons

Button	Function
FPS	Sets the frame rate of the sensor, adjustable from 0.750-60.000 fps in Regular Speed Mode, and from 60.000-120.000 fps in High Speed Mode. Note: High Speed Mode can only be activated with a valid High Speed license key installed in the camera.
AUDIO	Shows the current audio level. If AUDIO is set to Off, the audio input is switched off: no audio is embedded in the HD-SDI outputs, and no audio tracks are recorded on the **SxS PRO** cards. The same applies if AUDIO is disabled, which is the case if the sensor frame rate is different from the project fps setting (for example, while over- or undercranking).
SHUTTER	Sets the shutter angle of the sensor, adjustable from 5.0-358.0°. Shutter angle and sensor fps determine exposure time of the sensor in seconds by the following equation: angle/(360*fps). *Note: In High Speed mode, the shutter angle is limited to a maximum of 356.0°.*
EI	Sets the exposure index rated in ASA. The ALEXA has a base sensitivity of 800 ASA. The camera's EI rating can be adjusted from 160 to 3200 ASA. *Note: ASA rating is identical to ISO rating.* *Note: Exposure Index is not applied to ARRIRAW signals.*
COLOR	Opens the color screen, where gamma and look settings for internal recording (INT), REC OUT, MON OUT and EVF can be changed.
WB	Sets the camera's white balance. This is the color temperature of the light source that the ALEXA is currently adjusted for. The white balance can be adjusted from 2000 to 11000 Kelvin in steps of 100 Kelvin. In addition to the red/blue correction of the white balance, the ALEXA can also compensate for a green/magenta tint. This value, called CC (color compensation), is shown as an exponent of the WB value. Positive values are marked with a "+" and negative values with a "-". The user can execute an automatic white balance by pressing the **AUTO WB** button in the **WB** screen.

Camera Status Section

TC	Displays the current time code including the source (INT: internal, EXT: external source). Frames are not displayed. The timebase of the time code is shown after the @ sign.
MASTER	Camera is set to Ext sync: MASTER
SLAVE	Camera is set to Ext sync: SLAVE
	Settings sync is active
BAT 1	The voltage level of the power source present at the BAT

	connector, or the remaining capacity of an attached battery in percentage if it transmits this information.
BAT 2	The voltage level of a battery attached to the onboard battery adapter, or the remaining capacity of an attached battery in percentage if it transmits this information.
REEL	Identifies the current reel with the camera index letter, such as A or B and the reel number.
CLIP	Identifies the current clip with the clip index and clip number.
DUR	Displays the duration of the current clip during recording or the length of the last recorded clip while in standby in the format **h:mm:ss**.
	The camera is in standby and ready to record.
	The camera is recording.
	An error occurred and recording is not possible. Press the **INFO** button for more information.
	If nothing is shown, the camera has detected no errors, but no media is present for recording.

Cameras with **SxS** module

	Remaining capacity of the currently active **SxS PRO** card in minutes and seconds. It is calculated for the current framerate and codec.*
<	Marks the active **SxS PRO** card.

Cameras with XR module

	Type of inserted media (XR Capture Drive, **SxS PRO**)
	Remaining capacity of the inserted media in hours, minutes, and seconds. It is calculated for the current framerate and codec.*

* Note: When recording is set to ProRes™, the value shown is the minimum available recording time for the current sensor frame rate and codec combination. Apple ProRes™ is a variable bit rate codec, so the actual remaining recording time depends on the image content.
When using Avid's DNxHD, the remaining recording time is accurate.

Icons

Name	Icon	Description
General Warning		Important information is waiting on the INFO screen.
General Error		An error has occurred. Check the INFO screen for more information.

Temperature Warning		There is a minor sensor-temperature offset. Image quality may be slightly affected.
Temperature Error		There is a substantial sensor-temperature offset. Image quality may be seriously affected.
Lock		The Main Controls are locked.
SD Card		An SD card is present. The icon turns orange when the card is accessed.
Grab		The GRAB icon flashes while a still frame is being taken and written to the SD card.
High Humidity Mode		The sensor is in High Humidity mode (i.e. the sensor is kept at 40° C sensor temperature to avoid condensation).
Radio		The WRS radio is active.

Note: A sensor temperature warning or error after boot-up is normal as the sensor takes a few seconds to reach its preset temperature.

11.1.3.1 Lists and User Lists

On the HOME screen, press the **FPS**, **SHUTTER**, **WB** (white balance) and **EI** (exposure index) buttons to open lists of preconfigured values for each setting.

User-defined values can be added to the FPS, SHUTTER and WB lists. The EI list is fixed and user-defined values cannot be added. It contains values from 160-3200 ASA in steps of 1/3 stops.

Setting a list value

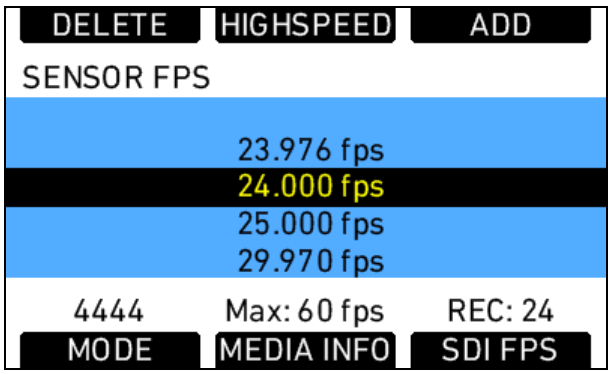


Figure 42: SENSOR FPS screen

Any value in a list may be set. Invalid values will appear grayed out.

To set a list value:

1. Rotate the jogwheel to select the desired list value.
2. Press the jogwheel to set the list value.

Adding a list value

If the desired list value does not appear in the list, a user-defined value can be added.

To add a list value:

1. Press the **ADD** button.
2. On the **ADD** screen, use the jogwheel and + or – buttons to enter a new list value.
3. When you are finished entering the new list value, press the jogwheel to add it to the list.

Note: Each list supports a maximum of 16 entries. To add new user-defined list values to a full list, you must delete previously added user-defined list values.

Deleting a list value

User-defined list values that are no longer required can be deleted.

To delete a list value:

1. Press the **DELETE** button.
2. On the **DELETE** screen, use the jogwheel to select the user-defined value you wish to delete.
3. Press both **DELETE** buttons simultaneously.

Note: Preconfigured values cannot be deleted and will appear grayed out on the DELETE screen.

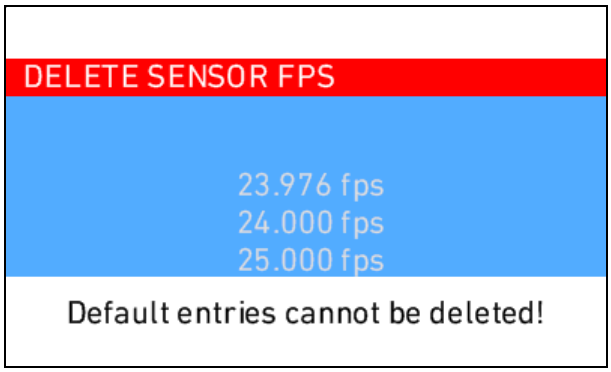


Figure 43: DELETE SENSOR FPS screen

Note: The EI list is static and cannot be changed by the user. It contains ASA values from 160-3200 ASA in steps of 1/3 stop.

11.1.3.2 FPS

Press the **FPS** (frames per second) button on the HOME screen to open the **SENSOR FPS** list screen, which lists the default frame rates as well as user-defined frame rates.

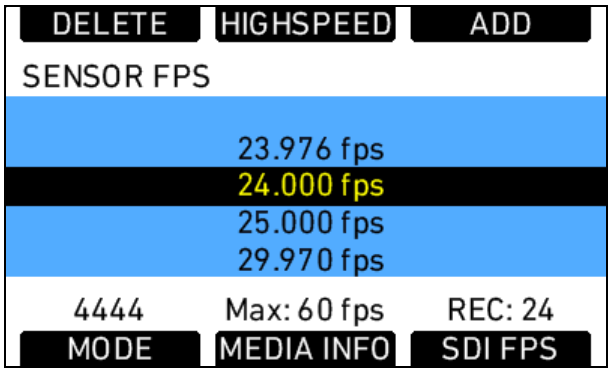


Figure 44: SENSOR FPS screen

Note: Access to this screen is disabled during record.

The maximum frame rate that can be set is dependent on the type of media and the codec.

The following table shows the maximum available frame rate for all codec/media combinations.

Codec	SxS PRO **8-32 GB**	SxS PRO **64 GB**	**XR Capture Drive**
16:9 HD			
ProRes 422 Proxy	60 fps (120 fps)[1]	60 fps (120 fps)[1]	60 fps (120 fps)[1]
ProRes 422 LT	60 fps (120 fps)[1]	60 fps (120 fps)[1]	60 fps (120 fps)[1]
ProRes 422	60 fps	60 fps (120 fps)[1]	60 fps (120 fps)[1]
ProRes 422 HQ	60 fps	60 fps (120 fps)[1]	60 fps (120 fps)[1]
ProRes 4444	40 fps	60 fps	60 fps
DNxHD 115/120/145[2]	60 fps	60 fps (120 fps)[1]	-
DNxHD 175x/185x/220x[2]	60 fps	60 fps (120 fps)[1]	-
16:9 2K			
ProRes 422 Proxy *through* 422 HQ	60 fps	60 fps	60 fps

ProRes 4444	40 fps	60 fps	60 fps
16:9 ARRIRAW[3]	-	-	60 fps (120 fps)[1]
4:3 2K			
ProRes 422 Proxy *through* 422	48 fps	48 fps	48 fps
ProRes 422 HQ	40 fps	48 fps	48 fps
ProRes 4444	30 fps	48 fps	48 fps
4:3 ARRIRAW[3]	-	-	48 fps (90 fps)[1]

[1]Requires a High Speed license, see below

[2]For cameras with an XR module, DNxHD will be available again in a later SUP release.

[3]Only available on ALEXAs with XR module

If the desired frame rate cannot be set because it is grayed out, change the codec to one with a lower data rate. For example, when using a 32 GB **SxS PRO** card and the ProRes 4444 codec, 60.000 fps will be grayed out. Set the ProRes 422HQ codec to enable 60.000 fps.

There are shortcut buttons on the **FPS** screen for **CODEC**, **INFO** and **SDI FPS**. In the **SDI FPS** screen, both MON OUT and REC OUT frame rates can be adjusted within the limits of their current format.

Setting sensor fps through REC OUT fps

When the **FPS** button is pressed on the HOME screen and the sensor frame rate is linked to the REC OUT frame rate, a message appears instead of the list. While this setting is active, the sensor frame rate can only be set by setting the REC OUT frame rate.

To link or unlink the sensor frame rate to the REC OUT frame rate:

1. Press the **MENU** button.
2. On the **Recording** menu, use the jogwheel to select **REC OUT**.

3. Select **REC OUT fps sets sensor fps** and set **On** or **Off**.

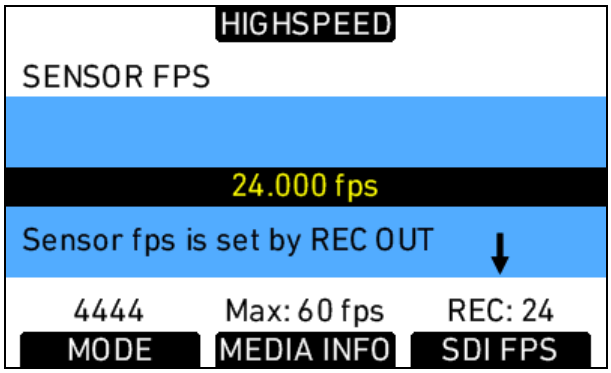


Figure 45: SENSOR FPS screen with linked sensor frame rate

Setting the correct frame rates when recording with external devices

When recording ARRIRAW or the 444 signal from the ALEXA to an external recorder, correct frame-rate settings are critical. Mismatched sensor and REC OUT frame rates could result in dropped frames and lost footage.

Setting the sensor frame rate determines the number of frames per second generated by the sensor. The range is 0.750 to 60.000 frames per second. The images are then processed by the camera electronics for the different output paths.

The REC OUT is the recording output path, which transmits images to an external recorder. The REC OUT frame rate is limited to standard speeds.

Ideally, the REC OUT frame rate matches the sensor frame rate. If the REC OUT frame rate is lower than the sensor frame rate, the images cannot be output as fast as they are created by the sensor, resulting in dropped frames and loss of data.

Note: If the REC OUT frame rate is lower than the sensor frame rate, a **!** warning will appear over the **SDI FPS** button.

If the REC OUT frame rate is higher than the sensor frame rate, duplicate frames are output over the REC OUT. For example, if the sensor is set to 10 fps and the REC OUT is set to 30 fps, every image is output three times, resulting in two duplicate frames following every active frame. A standard recorder would record these duplicate frames, which would have to be removed in post.

To prevent this extra step, the ALEXA marks the duplicate frames with a Variflag. If the recorder supports Variflag recording, it will discard the duplicate frames and only record the active frames. This saves valuable storage space and post-production work.

The MON OUT should match the sensor and the REC OUT frame rate. If the sensor frame rate exceeds the available MON OUT frame rates, set the MON OUT to half the sensor frame rate if possible to maximize the smoothness of the image when panning and tilting.

To correctly set frame rates for the REC OUT:

1. Press the **MENU** button.
2. Using the jogwheel, select the **Recording** menu.
3. Select **REC OUT**.
4. Set **Frame rate** to the desired frame rate. This frame rate should match the frame rate setting on the external recorder.
5. If the desired sensor frame rate is a standard speed, set **REC OUT fps sets sensor fps** to **On**.
6. Press the **HOME** button to exit.

To correctly set frame rates for the MON OUT:

1. Press the **MENU** button.
2. Using the jogwheel, select the **Monitoring** menu.
3. Select **MON OUT**.
4. Set **Frame rate** to the same frame rate as the REC OUT. If the REC OUT frame rate exceeds the range of the available MON OUT frame rates, set the MON OUT frame rate to half the value of the REC OUT frame rate.
5. Press the **HOME** button to exit.

To set a non-standard frame rate for the REC OUT:

1. Press the **MENU** button.
2. Using the jogwheel, select the **Recording** menu.
3. Select **REC OUT**.
4. Set **REC OUT fps sets sensor fps** to **Off**.
5. Press the **HOME** button to exit.
6. On the HOME screen, press the **FPS** button.
7. Select the desired frame rate from the list or add a user-defined frame rate (see Adding a list value in Lists and User Lists).

High Speed Mode

If a valid High Speed license key is installed on the ALEXA, frame rates from 60.000 to 120.000 fps are available in 16:9 High Speed mode, and from 48.000 to 90.000 fps in 4:3 ARRIRAW High Speed mode. Frame rates below 60.000 fps in 16:9 and 48.000 fps in 4:3 are not available. Exit High Speed mode to record with lower frame rates.

High Speed mode recording is possible only to internal recording media, not via the REC OUT outputs. When High Speed mode is loaded, the REC OUT outputs switch output paths and carry the MON OUT signal with a maximum frame rate of 30 fps.

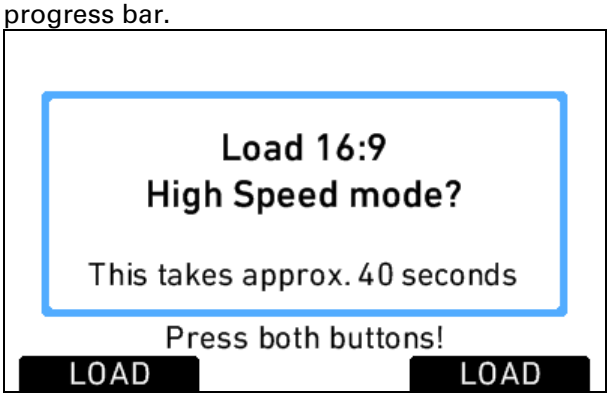
Note: In 16:9 sensor mode, High Speed mode recording is possible in HD codecs only. In 4:3 sensor mode, High Speed mode is only available when the

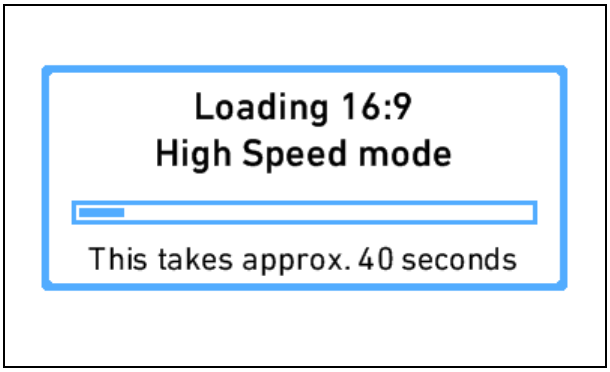
recording mode is set to ARRIRAW (only available for ALEXAs with XR module).
The maximum frame rate in ProRes 2K is 60 fps in 16:9 sensor mode and 48 fps in 4:3 sensor mode.

When recording to **SxS** cards, ARRI recommends using only Sony **SxS PRO** 64 GB cards in High Speed mode, as only these allow recording at sensor frame rates from 60-120 fps with all High Speed codecs. When using Sony **SxS PRO** 32 GB cards with codecs ProRes 422, ProRes 422 HQ, DNxHD 115/120/145 and DNxHD 175x/185x/220x, the sensor frame rate is limited to 60 fps maximum.

To load High Speed mode:

1. On the HOME screen, press the **FPS** button.
2. On the **FPS** screen, press the **HIGHSPEED** button.
3. Press both **LOAD** buttons simultaneously. Loading High Speed mode takes approximately 40 seconds and is indicated by a progress bar.





4. After loading, the current High Speed codec is displayed. Press the SET CODEC button to set a different codec.

Note: Starting from 4:3 Normal Speed, the resulting High Speed mode differs depending on the currently selected recording mode: With ProRes recording selected, the ALEXA will go to 16:9 High Speed. With ARRIRAW recording selected, the ALEXA will go to 4:3 High Speed. Exiting High Speed mode will always return to 4:3 Normal Speed.

To exit High Speed mode:

1. On the HOME screen, press the **FPS HS** button.
2. On the **FPS HIGHSPEED** screen, press the **EXIT HS** button.
3. Press both **EXIT** buttons simultaneously. Exiting High Speed mode takes approximately 40 seconds and is indicated by a progress bar.

11.1.3.3 AUDIO

Press the **AUDIO** button on the HOME screen to open the AUDIO screen. This screen shows the ALEXA's two audio channel levels. The audio levels are displayed from -45 dBFS to 0 dBFS.

Note: No audio meters are displayed on the HOME screen or AUDIO screen when audio is set to Off or audio is disabled. Audio is disabled when the sensor frame rate does not match the project frame rate.

Light blue markers show reference levels of -20, -18 and -9 dB FS.

Red markers at levels -1 and 0 dBFS warn of clipping. With a proper audio signal levels, the red markers should almost never be visible.

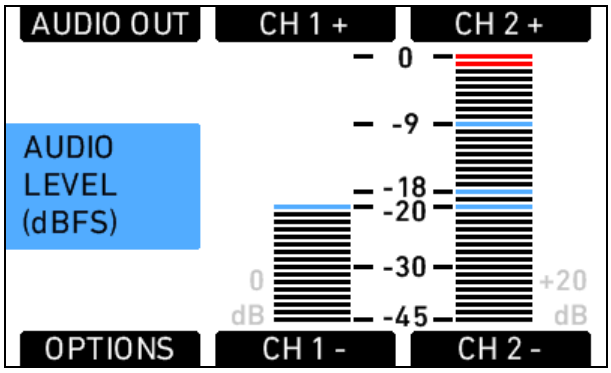


Figure 46: Audio screen

Gain can be applied to the audio channels by turning the jogwheel to set both channels, or by pressing the **CH 1+**, **CH 1-**, **CH 2+** and **CH 2-** buttons. The amount of gain applied by the camera is indicated next to the levels as light gray numbers.

Press the **OPTIONS** button to open the AUDIO IN>OPTIONS screen and set audio parameters.

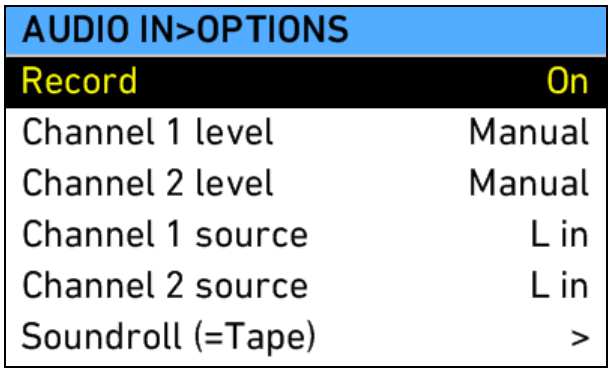


Figure 47: AUDIO IN>OPTIONS screen

Option	Description
Record	Turns audio recording **On** or **Off**. If audio recording is switched off, no audio is recorded internally, the HD-SDI contains no audio and the Audio out is muted.
Channel 1 level	Manual allows the user to manually apply gain to the input signal on channel 1 to reach a correct level. Unity matches a 4 dBu input signal to -20 dBFS. This setting leaves enough headroom for recording and avoids audio clipping. When Unity is selected, audio levels cannot be adjusted by the user.
Channel 2 level	Manual allows the user to manually apply gain to the input signal on channel 2 to reach a correct level. Unity matches a 4 dBu input signal to -20 dBFS. This setting leaves enough headroom for recording and avoids audio clipping. When Unity is selected, audio levels cannot be adjusted by the user.
Channel 1 source	Select the left or right input signal as the source for Channel 1.
Channel 2 source	Select the left or right input signal as the source for Channel 2.
Soundroll (=Tape)	Enter a name for the sound roll (also known as Tape in the menus of some recorders) of an external audio recorder, for easier sound synching in post-production. The name will be written to the FCP XML file and the Avid Log Exchange (ALE) file on the recording media.

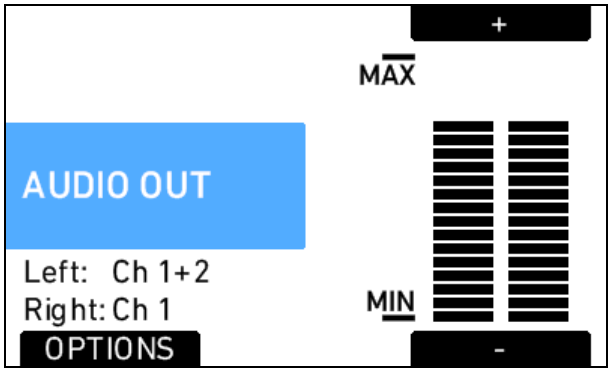


Figure 48: Audio out screen

Press the **AUDIO OUT** button to open the AUDIO OUT>OPTIONS screen where the global volume for both Audio out channels can be adjusted. The **OPTIONS** button opens a list of AUDIO OUT options.

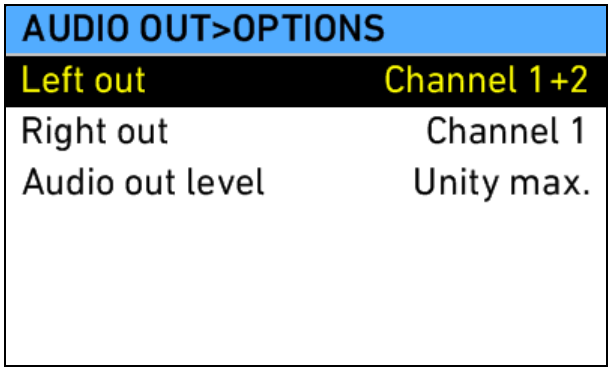


Figure 49: AUDIO OUT>OPTIONS

Left out	Sets which channel is routed to the left output.
Right out	Sets which channel is routed to the right output.
Audio out level	Set the level of the audio out channels manually, or set it to fix the maximum output.

Note: These settings do not influence the audio signal embedded in the HD-SDI connectors or recorded in QuickTime clips. They only affect the AUDIO OUT connector!

Note: ALEXA automatically determines the internal signal run time and matches audio and images so they are always in sync. When changing sensor fps or project fps, it may take up to 2 seconds for the camera to resync image and audio signals.

11.1.3.4 SHUTTER

Press the **SHUTTER** button in the HOME screen to open the SHUTTER ANGLE screen.

Note: Access to this screen is disabled during record.

The list of default shutter angles includes 11.2°, 22.5°, 45.0°, 90.0°, 172.8°, 180.0°, 270.0° and 358.0°. User-defined shutter angles can be set by pressing the **ADD** button. The exposure time for the current frame rate and shutter angle is indicated in seconds at the bottom of the SHUTTER ANGLE screen.

The shutter angle range is 5.0° to 358.0°. In High Speed mode, the shutter angle is limited to a maximum of 356.0°.

Below the list, the actual exposure time at the currently set frame rate is shown.

Note: Be aware that the combination of long exposure times (a low sensor frame rate and large shutter angle) and high exposure indexes can lead to image artifacts! Try to avoid exposure times longer than 1/25th of a second for maximum image quality.

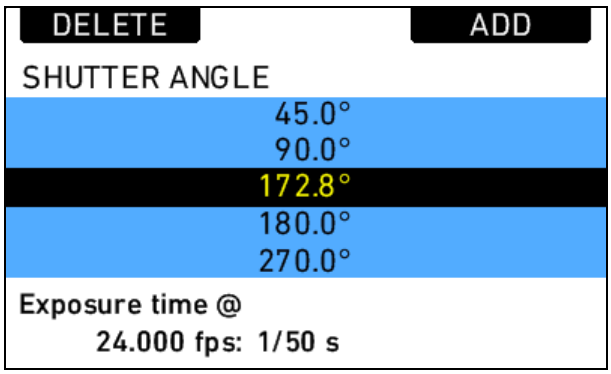


Figure 50: Shutter list

11.1.3.5 EI

The Exposure Index (EI) is the applied sensitivity of the camera.

The ALEXA has a base sensitivity of 800 ASA. This means that the dynamic range is almost evenly distributed above and below neutral gray with low noise in the shadows and clean, smooth clipping behavior in the highlights.

Due to its high dynamic range, the ALEXA's sensitivity can be set from 160 to 3200 ASA in steps of 1/3 stops while maintaining high image quality.

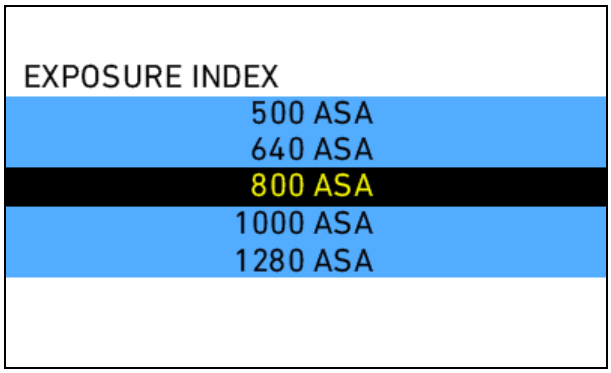


Figure 51: Exposure Index screen

Note: The Exposure Index list has fixed content, meaning that it cannot be changed by the user.

Applying the exposure indexes at the extremes of the range will nonetheless have an influence on the images. At low exposure indexes, such as 160 ASA, the dynamic range below neutral gray increases, reducing noise even further. At the same time, the dynamic range above neutral gray is slightly reduced. Highlight clipping itself is not influenced by this, but the shoulder of the gamma curve will get slightly steeper, reducing the smoothness of the clipping.

At high exposure indexes, such as 1600 ASA, the images behave in the opposite way. Noise is increased, which makes it important to judge shadow detail, while the highlight clipping behavior will be even smoother.

Figure 52: Exposure Indexes and latitude above and below neutral gray

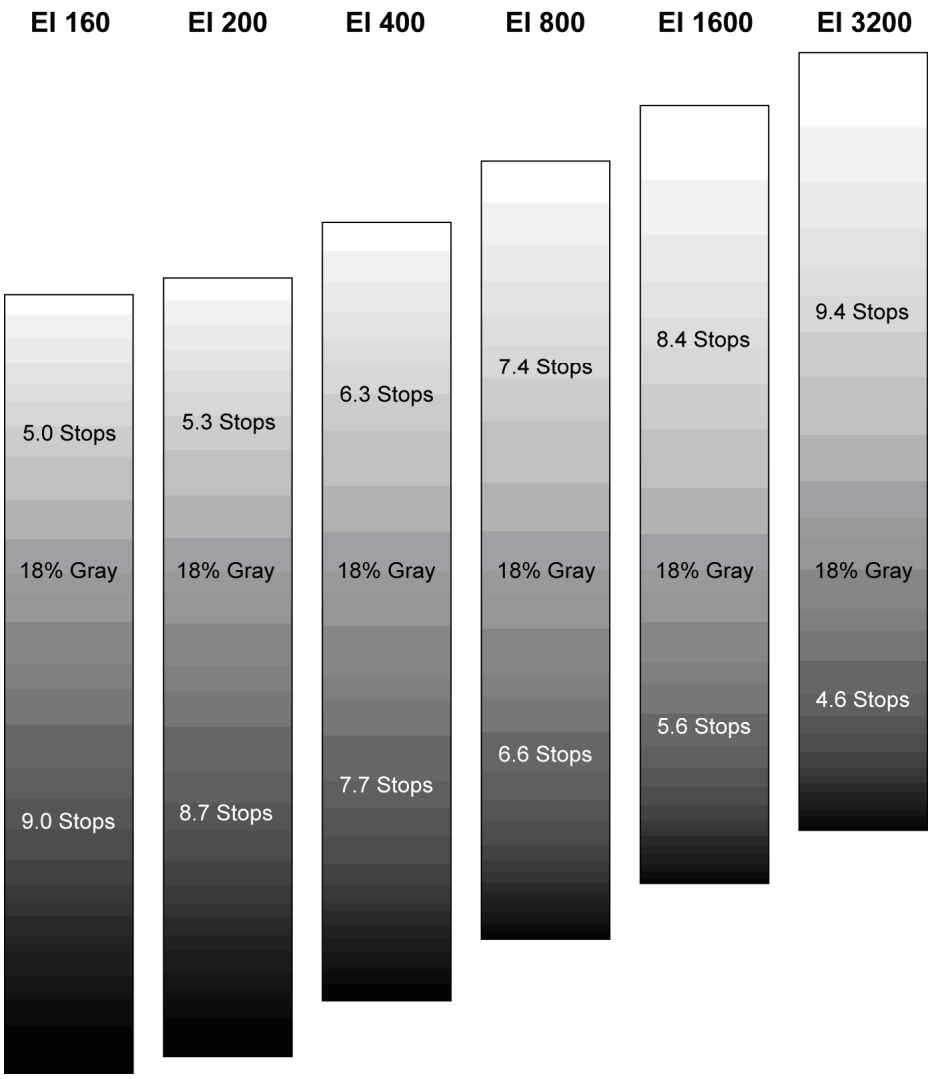


Figure 53: Graphical comparison of latitude at different exposure indexes

11.1.3.6 COLOR

Press the **COLOR** button to open the COLOR screen. The COLOR screen displays a graphical overview of the color management settings applied to the camera's output paths, including:

- the current gamma setting of the EVF, MON OUT, REC OUT and internal recording
- which ARRI Look File is set
- which output paths the Look File is applied to

The COLOR screen also has buttons for opening the GAMMA screen, selecting a Look File, and applying Look Files to the camera's output paths.

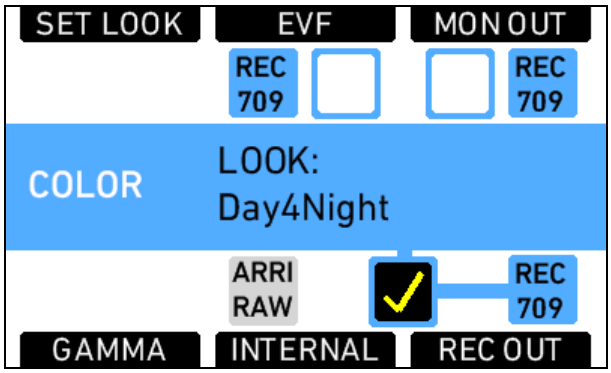


Figure 54: COLOR screen

Gamma

Press the **GAMMA** button to open the GAMMA screen and set the gamma of the internal recording, REC OUT, MON OUT and EVF image paths.

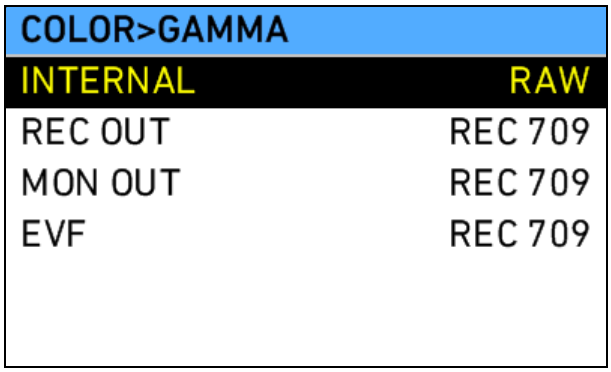


Figure 55: GAMMA screen

Gamma defines the contrast curve that is applied to the image. In the ALEXA, there are two gamma settings available:

- LOG C
- REC 709

Note: Starting with SUP 7.0, DCI P3 is no longer available as a gamma option.

LOG C	LOG C is a Cineon-specification gamma for output to film print or digital intermediate. Color-grading is a required post-production step in the LOG C workflow. Standard broadcast monitors cannot properly display LOG C images so a conversion look up table (LUT) is necessary for display, dailies and editing proxies. LOG C images will appear flat and desaturated when displayed on standard broadcast monitors. ALEXA preview LUTs can easily be generated using the ARRI LUT Generator, a web application available on www.arridigital.com.
REC 709	REC 709 is a video display gamma that complies with the ITU.R-BT709 standard. REC 709 images can be displayed on standard broadcast monitors.

Note: In High Speed mode, a gamma setting cannot be applied to the REC OUT as the MON OUT output path is rerouted to the REC OUT.

ARRI Look Files

ARRI Look Files are a way for the user to alter the parameters the ALEXA uses when converting the sensor image data to a video color space. This can be described as applying a custom "look" to the different image output paths. The Look File can be applied directly to the recorded image (destructive workflow), or just to the monitoring paths and included in the clip as metadata only (non-destructive workflow).

The ALEXA contains one preloaded Look File called Low Contrast Curve (LCC). This Look File contains a custom tone map curve that creates a video image with lower contrast compared to the standard REC 709 output. As a result, the image holds as much dynamic range information as possible, without using LOG C encoding. Highlight and shadow detail that would be lost in the typical REC 709 tone mapping can still be accessed.

ARRI LOOK Creator, a free application from ARRI, and some third-party applications can be used to create ARRI Look Files from DPX-format frame grabs taken on the ALEXA.

To apply a Look File:

1. On the HOME screen, press the **COLOR** button.
2. Press the **SET LOOK** button.
3. Using the jogwheel, select a Look File from the list on the LOOK FILES screen. The default preloaded Look File is LCC.
4. Press the jogwheel to set the Look File.

On the COLOR screen, press the **EVF**, **MON OUT**, **INTERNAL** and/or **REC OUT** buttons to apply the Look File to the desired output paths. An applied Look File is indicated by a check mark in the box corresponding to each output path. Look Files can only by applied to output paths that are set to REC 709 gamma.

Note: If the INTERNAL or REC OUT paths are set to REC 709 gamma and a Look File is applied, the recorded image on the internal media or external recording device will be permanently altered by that Look File.

Note: If both the INTERNAL and REC OUT paths are set to REC 709 gamma, a Look File can only be applied to either both or none of them.

Note: In High Speed mode, a Look File cannot be applied to the REC OUT as the MON OUT output path is rerouted to the REC OUT.

Additional Look Files can be added to the ALEXA from the SD card. The Look Files must be copied into the **LookFiles** folder on the SD card. The required folder structure on the SD card can be created via **MENU>System>SD card>Prepare SD card**.

To add a Look File to the camera:

1. On the HOME screen, press the **COLOR** button.
2. Press the **SET LOOK** button.
3. Press the **ADD** button.
4. Using the jogwheel, select a Look File from the list on the LOOK FILES (SD CARD) screen.
5. Press the jogwheel to add the Look File. The Look File will be added to the list on the LOOK FILES screen.

To delete a Look File from the camera:

1. On the LOOK FILES screen, select a Look File from the list.
2. Press the **DELETE** button.
3. Press both new **DELETE** buttons simultaneously. The Look File will be deleted from the camera but will remain on the SD card.

Playback and Look Files

The Look File applied to the camera outputs also applies to clips during playback. A clip recorded in REC 709 with or without Look File will be played back "as is", even if the output is set to LOG C.

Please note that the currently active Look File is applied to the clip, not the one that was active at the time of recording. It is the responsibility of the user to make sure the correct Look File is applied during playback.

CDL Server Connection

When internal recording is set to ARRIRAW (only available on ALEXAs with XR module), it is possible to configure a CDL server connection instead of using an ARRI Look File. With a CDL server connection enabled, the ALEXA will retrieve the CDL information from the CDL server at the beginning of each recording and store the values in the clip metadata. Additionally, the ALEXA retrieves the CDL information at the end of each recording to update the CDL values in case they have been modified during the shot. The values from the beginning of the shot, however, are still accessible during offloading as "old" values. Due to technical limitations, however, it is not possible to directly apply CDL values in the ALEXA to outputs or recorded material.

To configure a CDL server connection:

1. On the LOOK FILES screen, select **CDL CONF**.
2. Enter the IP address of the CDL server.

Note: The CDL server must be located in the same /16 subnet as the ALEXA. Therefore the first two parts of the IP address cannot be changed.

Note: The CDL server must be reachable at port 6666.

To activate/deactivate the CDL server connection:

- On the LOOK FILES screen, press **CDL**.

When the connection to a CDL server is activated, it is no longer possible to select an ARRI Look File or apply it to outputs. The gamma settings for the individual outputs are still available.

With the CDL server connection enabled, the ALEXA periodically tries to contact the CDL server and displays the connection status on the LOOK FILES screen as well as on the HOME screen. When the CDL server connection is established, INT in the COLOR section of the HOME screen has a green background, otherwise the background is red and it is blinking.

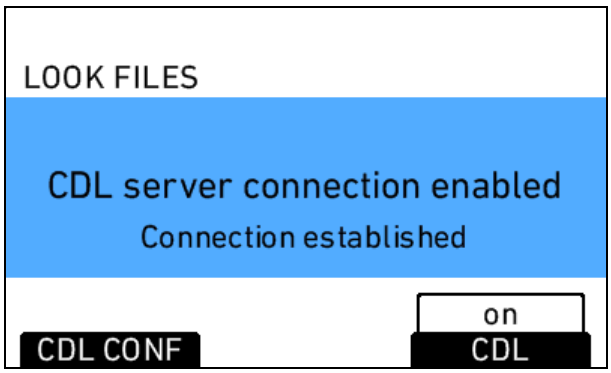


Figure 56: LOOK FILES screen with CDL server connection enabled and established

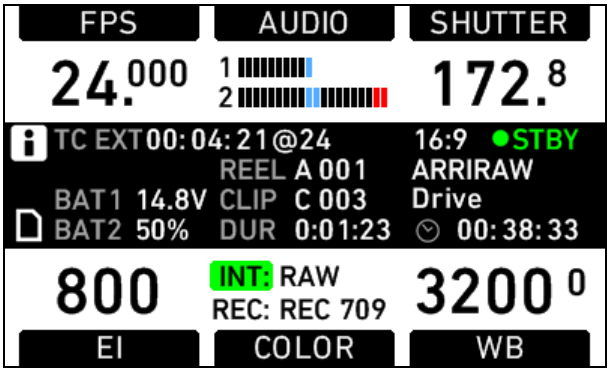


Figure 57: HOME screen with CDL server connection enabled and established

11.1.3.7 WB

White Balance (WB) is the color balance of the camera according to the lighting in use. There are three options for setting the white balance:

- white balance presets
- user-defined white balance
- automatic white balance

On the HOME screen, press the **WB** button to open the WHITE BALANCE screen. The ALEXA has the following white balance presets:

Tungsten	3200K 0CC
Fluorescent	4300K 0CC
Daylight	5600K 0CC
Daylight Cool	7000K 0CC

White balance is a red-blue adjustment of the image. To adjust the green-magenta balance, use the color compensating (CC) adjustment.

For example, a fluorescent source will have peaks in its spectrum that cannot be corrected with the traditional white balance. The CC shift can correct these peaks up to a full green or full magenta gel. One step of CC SHIFT is equal to 035 Kodak CC values or 1/8 Rosco values.

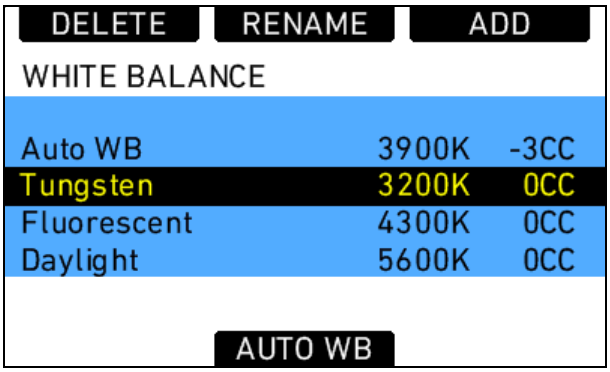


Figure 58: WHITE BALANCE screen

ARRI recommends adjusting white balance and color compensation using appropriate measuring equipment such as a vectorscope with calibrated gray card or a color meter.

If the desired white balance setting does not appear in the WHITE BALANCE list, a user-defined white balance can be added.

To add a white balance:

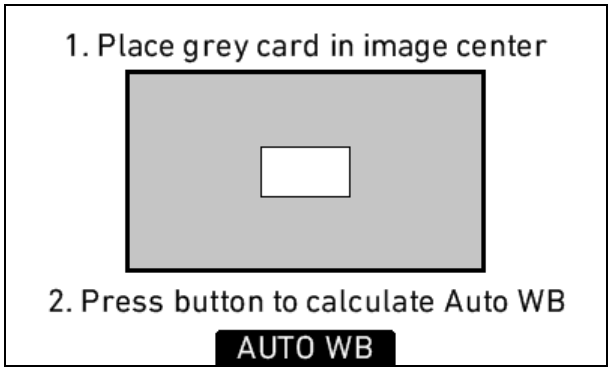
1. On the HOME screen, press the **WB** button.
2. Press the **ADD** button.
3. Rotate the jogwheel to adjust the white balance value in steps of 100K or press the + 1000K and – 1000K buttons.
4. Press the jogwheel or <> button to select the CC adjustment.
5. Rotate the jogwheel to adjust the CC value.
6. Press the jogwheel to add the new white balance to the WHITE BALANCE list.

To perform an automatic white balance:

1. On the HOME screen, press the **WB** button.
2. Press the **AUTO WB** button.
3. Place a well-lit gray card in the center of the image and press the **AUTO WB** button. The ALEXA will calculate the white balance and color compensation values and set these values for the "Auto WB" entry in the list.

Note: The automatic white balance will be overwritten each time a new one is calculated.

Note: If the gray card is significantly over- or underexposed, the ALEXA may not be able to calculate a white balance value and will display an error message.



To rename a white balance:

1. On the HOME screen, press the **WB** button.
2. Using the jogwheel, select the name of the white balance you wish to rename.
3. Press the **RENAME** button.
4. Use the jogwheel to enter a new name.

5. Press the **DONE** button to save the new name.

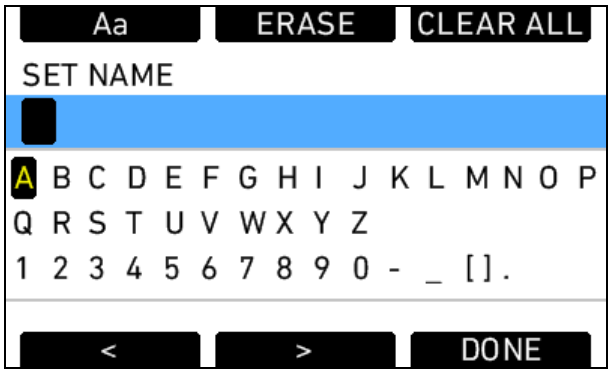


Figure 59: WB SET NAME screen

Note: Default white balance values cannot be renamed.

11.1.4 Function Buttons

The main controls feature the following function buttons:

ON/OFF	Press once to switch the camera on. Press and hold for 5 seconds to switch off the camera. A countdown will be displayed on the HOME screen. If the button is released before the countdown has elapsed, the camera does not switch off.
REC	Press to start and stop internal recording and send start and stop record signals over the REC OUT to an external recording device.
LOCK	Press and hold for 3 seconds to lock or unlock the main camera controls and function buttons. The recessed function buttons **USER**, **REC** and **ON/OFF** cannot be locked and remain available. A lock symbol on the HOME screen indicates that the lock is engaged.
GRAB	Press to take a still frame and write it to the SD card. The write process is indicated by a flashing camera icon, followed by a flashing SD card icon on the HOME screen. When writing is finished, a new still frame can be taken.
TC	Press to open the TIMECODE screen.
WRS	Press to open the Wireless Remote System screen. Available on ALEXA Plus, ALEXA Studio and ALEXA M only.
PLAY	Press to open the playback screen and activate playback on MON OUT and EVF. When the playback screen is opened, the last clip on the internal media that is on active standby will be loaded automatically.

INFO Press to open the LIVE INFO screen. The LIVE INFO screen displays the camera's current system state and any current error messages. On the LIVE INFO screen, there are buttons to access the following additional information screens:

- VERSION
- MEDIA
- SYSTEM
- SAVE TO SD (press to save a log file)
- FPS INFO

USER Press to open the USER BUTTONS screen. There are six user buttons that can be assigned by the user. Buttons 1, 2 and 3 are shared with User Buttons 1, 2, and 3 in the operator controls. Press the jogwheel to see a complete list of user button options.

MENU Press to open the MENU screen, where most camera settings can be adjusted.

BACK Press to go back to the previous menu or screen when navigating. Press to cancel settings adjustments and revert to the previous setting.

HOME Press to return to the HOME screen from any menu or screen.

11.1.4.1 TC

Press the **TC** button to open the TIMECODE screen. The TIMECODE screen displays the current timecode and timecode format settings.

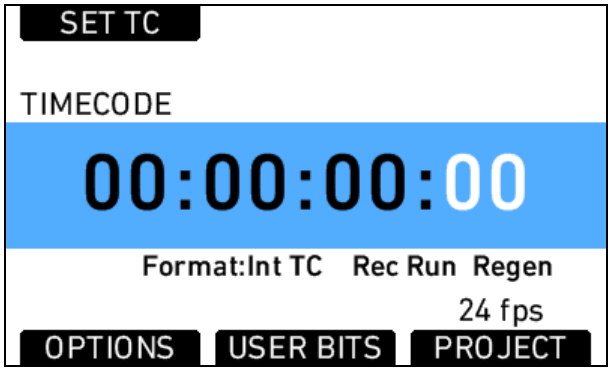


Figure 60: Timecode screen

Note: Individual frame values are not shown but are still counted.

Press the **SET TC** button to set the TC counter (only when the timecode source is set to Int TC). On the SET TIMECODE screen, press the **SET 2 TIME** button to match the counter to the camera's system clock. Press the **RESET** button to reset counter to zero.

The **PROJECT** button is a quick link into the PROJECT menu screen, where project fps can be adjusted. Project fps sets the time base of the time code.

TIMECODE OPTIONS

Press the **OPTIONS** button to open the TIME CODE OPTIONS screen.

Select **Source** to choose the timecode source. Available sources are:

Int TC	Internal TC counter
Ext LTC	TC is read from the LTC input. Only possible with Mode set to Free Run, and the project frame rate must match the sensor frame rate.

Select Mode to define how the timecode is counted. Available modes are:

Rec Run	TC will only run while recording. The TC value increases with every frame generated by the sensor while recording in the project time base.
Free Run	TC runs free. If the source is set to Int TC, and the sensor frame rate does not match the time base of the TC, the value counts up with every new frame generated by the sensor in the project time base.

Select **Generator** to set the camera's timecode generator. Available generators are:

Regen	Rec Run TC is regenerated from the last valid TC value. When set to Ext LTC, the camera continuously reads the TC signal at the LTC connector as long as it is present. Upon disconnection or loss of signal, the camera continues counting on its own. When the external signal is reconnected, the camera uses the values of the external signal again. When set to Int TC, the value increases with each new frame generated by the sensor.

Jam sync	Only Ext LTC can be jam sync'd. This means that the external TC source is connected to the camera, then the camera reads the external TC count and continues counting on its own. The precise crystal oscillator in the ALEXA will count accurately for up to eight hours. After eight hours, re-jam sync the camera to prevent timecode offset. The camera can be sync'd to TC signals whose time base differs from the camera's project time base, as long as both are integer (24, 25 and 30 fps) or non-integer (23.976 and 29.97 fps) signals. It is not possible to mix integer and non-integer signals.

Note: It is recommended to jam-sync after every shooting break to avoid the risk of losing timecode sync during a shot.

Note: The camera will keep its TC for about 10 minutes after disconnection from the power source. If a power source is connected, the camera will remember its TC for as long as the power source is connected, even if it is switched off.

Select **User bit source** to set the source of the user bits. Available user bit sources are:

Internal	User bits are set manually in the User Bit screen.
UB in Ext TC	When the timecode source is set to Ext LTC, the user bits are sampled from the external signal.

Note: The camera will force timecode to *Int TC* and *Regen* if the sensor frame rate does not match the project frame rate.

Note: Non-integer TC time base settings 23.976 and 29.97 are always counted as non-dropframe time code.

USER BITS

Press the **USER BITS** screen button to access the USER BITS screen. For each user bit, values from 0 to 9 and A to F can be set.

Press the **SET UB** button to start editing the user bits values.

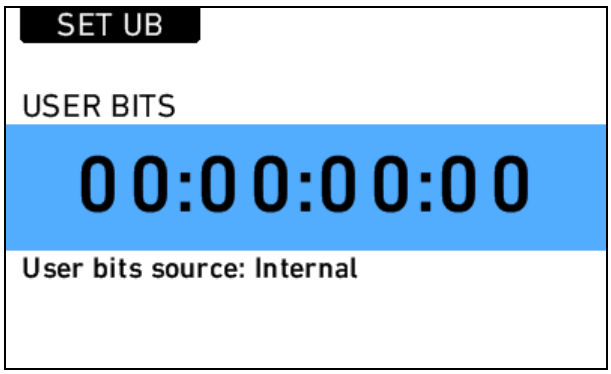


Figure 61: USER BITS screen

Note: On HD-SDI out, the last two digits of the user bits contain the Variflag, therefore the last two user bits cannot be set by the user.

11.1.4.2 INFO

STATUS Info

The STATUS INFO screen displays information about the current state of the camera system. *System state: Good* means that all components in the ALEXA are functioning normally. Other messages can contain error messages prefixed with *E:*, or warnings prefixed with *W:*. For more information about error messages and warnings, see *A.4 Error Messages and Warnings* in the Appendix.

Press the **SAVE TO SD** button to save a system log to the SD card. This may take up to one minute.

Note: It is only necessary to save a system log if the camera experiences multiple error messages or other abnormal behavior. The system log is not a human-readable file and should be sent to an ARRI Camera Service center for analysis.

VERSION Info

Cam serial no.	The serial number of the camera.
Cam ID	Translation of the camera serial number to Base36, with an additional prefix for 3D applications.
Firmware	Version number of the currently installed camera Software Update Packet (SUP).
EVF serial no.	The serial number of the Electronic Viewfinder EVF-1 attached to the camera.
EVF firmware	Version number of the Electronic Viewfinder EVF-1 firmware.

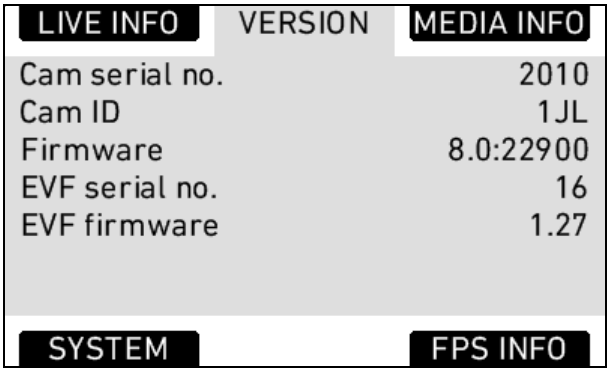


Figure 62: VERSION info screen

MEDIA Info

Int. Rec. Mode	Current mode for internal recording.
Status	Current status of internal media.
Free capacity	Free storage space displayed as a percentage.
Max. fps current	Maximum frame rate with current codec.

Media size	Total available storage space on media

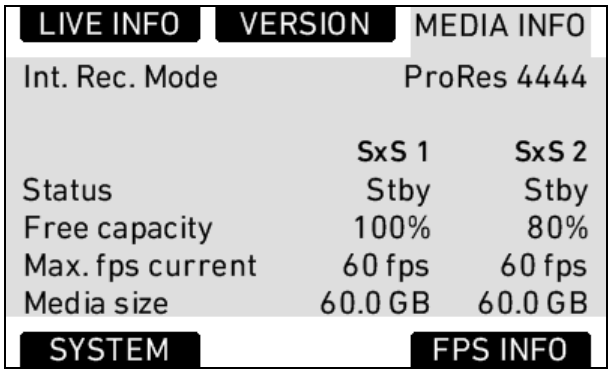


Figure 63: MEDIA INFO screen with SxS module

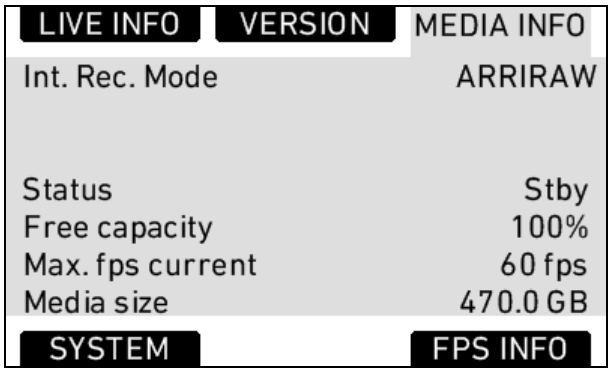


Figure 64: MEDIA INFO screen with XR module

SYSTEM Info

Time/Date	Current date and time. To set the date and time, press the **MENU** button, select **SYSTEM** and select **DATE/TIME**.
Fan speed	Speed of the camera's cooling fan in rotations per minute.
Sensor mode	Shows the active sensor mode: 16:9 or 4:3. 4:3 mode is only available on the ALEXA Plus 4:3, ALEXA Studio and ALEXA M.
Sensor temperature	Current temperature of image sensor. Target is 35°C in standard mode, 40°C in high humidity mode.
IP address	IP address of the camera's Ethernet port.
Operating time	Shows the total operating time of the camera in hours (since first installation of SUP 4.0 or higher)

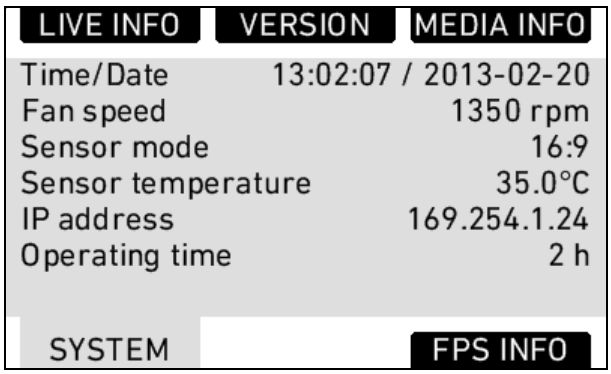


Figure 65: SYSTEM info screen

FPS Info

The FPS Info screen displays an overview of the current frame rates set in the camera and the maximum frame rate possible on the media loaded in the camera at the current settings.

Sensor fps	Frames per second generated by the sensor
Project fps	Time base the camera will use for counting timecode and the frame rate used for on-camera playback of internally recorded clips
REC OUT frame rate	Frame rate output over the REC OUT HD-SDI
MON OUT frame rate	Frame rate output over the MON OUT HD-SDI
SxS CARD 1/2 / Media max. fps current	Maximum frame rate the loaded media can record at the current codec.

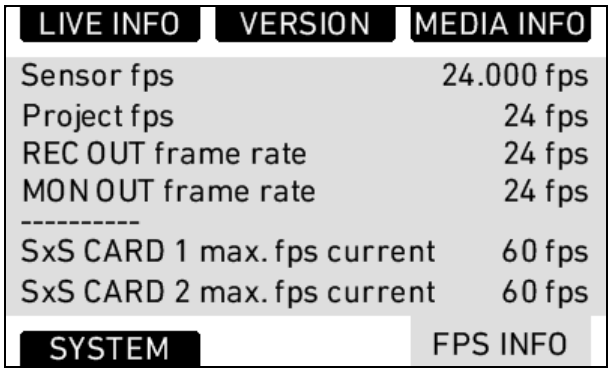


Figure 66: FPS Info screen with SxS module

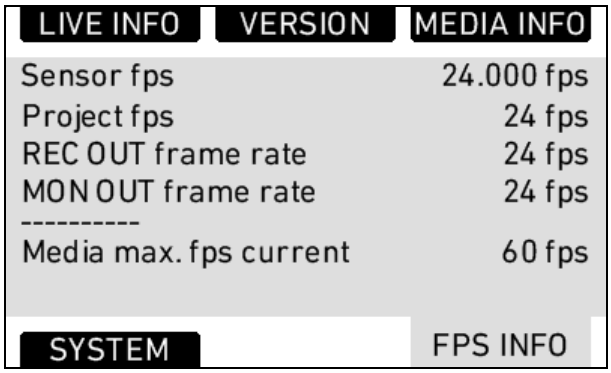


Figure 67: FPS Info screen with XR module

11.1.4.3 USER

Press the **USER** button to open the USER BUTTONS screen. There are six assignable user buttons. **Buttons 1, 2** and **3** are shared with **User Buttons 1, 2,** and **3** in the operator controls. Press the jogwheel to see a complete list of user button options.

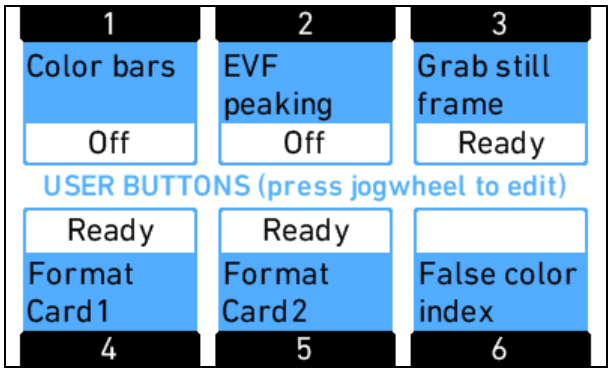


Figure 68: USER BUTTONS screen

Assign functions to the buttons by using the jogwheel.

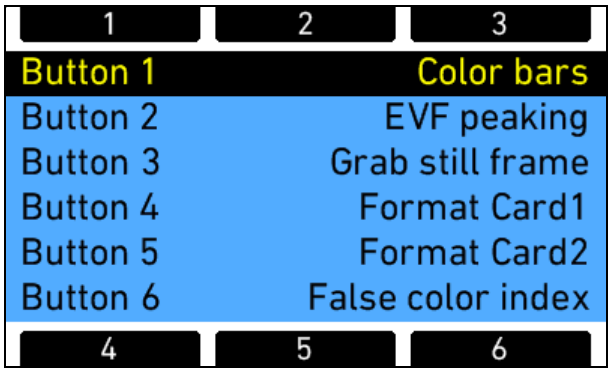


Figure 69: Edit User Button assignment

The following table lists all available functions and if they can be assigned to user buttons 1-3 (identical for on-screen and buttons on camera-left side), 4-6, or both:

Name	Description	1-3	4-6
None	button has no function	X	X
MON OUT surround	toggles surround view of the MON OUT on or off	X	X
MON OUT gamma	toggles gamma of MON OUT between REC 709 and LOG C (only when recording gamma is set to LOG C)	X	X
MON OUT look	toggles the ARRI Look File on the MON OUT on or off (only if Look File is set and the MON OUT is set to REC 709)	X	X
MON OUT frame lines	toggles frame lines on the MON OUT on or off	X	X
MON OUT status info	toggles status info on the MON OUT on or off	X	X
MON OUT false color	toggles false color display on MON OUT on or off	X	X
MON OUT peaking	toggles peaking on MON OUT on or off	X	X
MON anam. desqueeze	toggles anamorphic desqueeze options on MON OUT *Requires a valid Anamorphic De-squeeze license key installed on camera*	X	X
Frame lines color	toggles the color of frame lines between White, Red, Green, Blue, Yellow and Black	X	X
Return in active	toggles the RET IN signal on or off on the EVF and MON OUT as set	X	X
Toggle SxS	toggles the active **SxS** slot between **SxS** slots 1 and 2. **SxS PRO** cards must be loaded in both. *Only on ALEXAs with SxS module*	X	X
Color bars	activates color bars on MON OUT and REC OUT	X	X
EVF surround	toggles surround view on the EVF image on or off	X	
EVF gamma	toggles gamma on the EVF between REC 709 and LOG C (only when recording gamma is set to LOG C)	X	

EVF look	toggles the ARRI Look File on the EVF on or off (only if Look File is set and the EVF is set to REC 709)	X	
EVF frame lines	toggles frame lines on the EVF image on or off	X	
EVF status info	toggles status info on the EVF image on or off	X	
EVF zoom	toggles the zoom function on the EVF	X	
EVF false color	toggles false color display on the EVF on or off	X	
EVF peaking	toggles peaking on the EVF on or off	X	
EVF anam. desqueeze	toggles anamorphic desqueeze options on EVF *Requires a valid Anamorphic De-squeeze license key installed on camera*	X	
Grab still frame	takes a still frame and saves it to the SD card *Disabled in High Speed mode*	X	
Check last clip	plays the last 5 seconds of the last clip, then returns to a live image	X	
Circle clip	marks the clip as a good take or a print during recording or playback	X	
Auto WB	Press once to open the AUTO WB sceen. Press again to perform an automatic white balance.	X	
Grab GUI	takes a still image of the current main camera control screen on the LCD and saves it to the SD card as a .png file in the *ScreenCaptures* folder	X	
Format media	quick link to the **Format media** screen *Only on ALEXAs with XR module*		X
Format Card 1	quick link to the **Format SxS CARD 1** screen *Only on ALEXAs with SxS module*		X
Format Card 2	quick link to the **Format SxS CARD 2** screen *Only on ALEXAs with SxS module*		X
False color index	displays the FALSE COLOR INDEX screen		X
Mirror shutter	toggles the mirror shutter between View position, Gate position, and running *Only on ALEXA Studio*		X

11.1.4.4 PLAY

Clips that have been recorded internally can be played back by the camera on the EVF, MON OUT and REC OUT.

Note: The REC OUT signal cannot be used for playback when it is set to ARRIRAW on an ALEXA with SxS module.

To play clips that have been recorded internally:

1. Press the **PLAY** button.
2. On the PLAY screen, the last clip recorded loads. Press the jogwheel to play the clip.
3. Press the jogwheel to pause the clip.
4. Rotate the jogwheel to advance the clip frame by frame, or in one second steps. Press the **STEPSIZE** button to toggle between seconds and frames.
5. Press the **+10%** and **–10%** buttons to advance or rewind the clip by ten percent of its duration.
6. Press the **HOME** button or **BACK** button to exit and output a live image over the output paths.

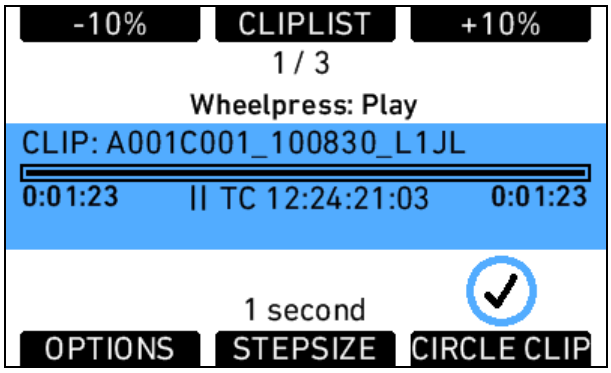


Figure 70: PLAY screen

PLAY screen buttons

STEPSIZE	Toggle the scrub step size between one frame and one second.
CIRCLE CLIP	Press to mark the clip as a circle take. This information will be embedded in the metadata of the clip.
+10%	Advance the current clip by ten percent of the clip duration.
-10%	Rewind the current clip by ten percent of the clip duration.

Note: Recorded clips do not contain the surround view portion of the EVF-1 or MON OUT image. When playing back clips, the surround view portion will not be visible.

The jogwheel can be used to scrub through the paused clip. The scrub stepsize is shown in the lower middle section of the screen.

Additional PLAY screen information:

- clip name
- playback progress bar with current playback position in time and total clip duration
- playback timecode

Note: Do not eject media during playback.

OPTIONS

The OPTIONS screen button opens a list of general playback options.

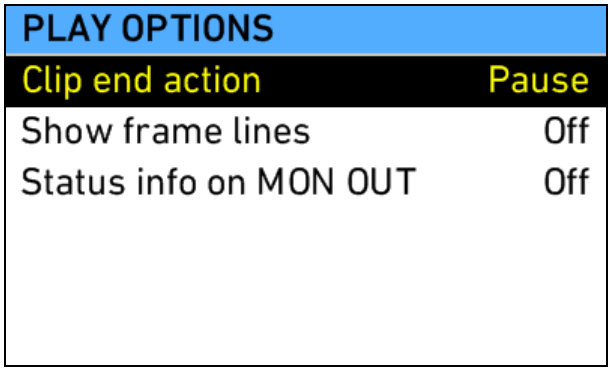


Figure 71: PLAY OPTIONS screen

Clip end action	Determines what happens when the end of a clip is reached. Options are Pause and Loop.
Show frame lines	Sets frame lines to On or Off during playback. Center mark is always switched off during playback.
Status info on MON OUT	Sets status info overlays on MON OUT during playback to On or Off.

CLIPLIST

Press the **CLIPLIST** button to open the CLIPLIST screen and access all the clips recorded internally.

To play a clip from the cliplist:

1. Press the **CLIPLIST** button.
2. Use the jogwheel to select a clip.
3. Press the jogwheel to load the selected clip.
4. Press the jogwheel to play the selected clip.

Additional CLIPLIST screen information:

- number of selected and total number of clips on the media
- codec of selected clip
- duration of selected clip

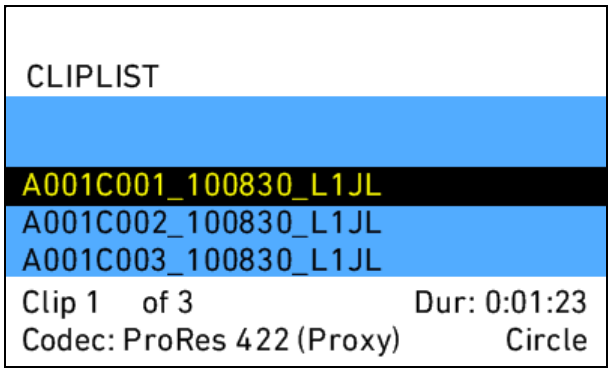


Figure 72: CLIPLIST screen

Playback and Look Files

The Look File applied to the camera outputs also applies to clips during playback. A clip recorded in REC 709 with or without Look File will be played back "as is", even if the output is set to LOG C.

Please note that the currently active Look File is applied to the clip, not the one that was active at the time of recording. It is the responsibility of the user to make sure the correct Look File is applied during playback.

11.1.5 Menu

The menu contains parameters for basic camera setup. It has a tree structure and the current path in the menu is displayed across the top of every screen.

Press the **MENU** button to open the MENU screen. There are six submenus in the main menu for setting up the ALEXA:

- Recording

- Monitoring
- Project
- System
- Frame grabs
- User setups

Links to submenus can be identified by an arrow bracket character on the right side. To access a submenu, select the submenu link and press the jogwheel to open the submenu. Press the **BACK** button to step back one menu.

Menus also contain parameters with editable values. The parameter name is displayed on the left side of the menu, and the current value is displayed on the right side of the menu. To change a parameter value, select it with the jogwheel and press the jogwheel to start editing the value. Press the **BACK** button to cancel an edit. When a parameter is displayed in gray, it cannot be edited with current camera settings.

Press the **HOME** button from any menu or submenu to return to the HOME screen.

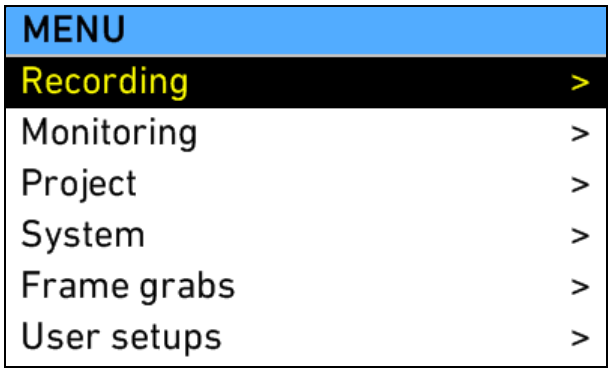


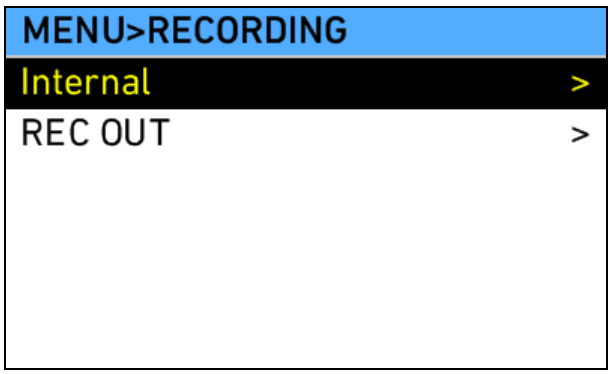
Figure 73: MENU

11.1.5.1 Recording

Select the Recording menu to adjust all recording parameters for recording to internal media and to external recorders over the REC OUT outputs. The Recording menu contains two submenus:

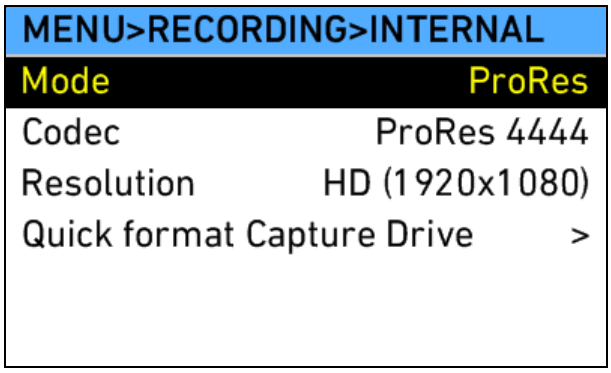
- Internal

- REC OUT



INTERNAL

Select the INTERNAL submenu to adjust parameters for internal recording.



Mode

Select for recording options:

- Off,
- ProRes™
- DNxHD (requires license key, on ALEXAs with XR module available again in a later SUP version)
- ARRIRAW (only available on ALEXAs with XR module)

With recording off, power consumption is reduced by 15 W. Switching recording on or switching between recording modes takes approximately 20 seconds.

Codec
Not available in High Speed mode.

Select to set the codec:

- full range of Apple ProRes™ codecs
- two types of Avid DNxHD codecs (requires license key, on ALEXAs with XR module available again in a later SUP version).

HS codec
Only available in High Speed mode.

Select to set the codec for High Speed mode:

- full range of Apple ProRes™ codecs

	except ProRes 4444 • two types of Avid DNxHD codecs (requires license key, on ALEXAs with XR module available again in a later SUP version).
Resolution	Select to set the resolution: • HD (1920x1080) • 2K (2048x1152) in 16:9 mode. *Note: In 4:3 mode, resolution is fixed at 2K (2048x1536).* *Note: DNxHD codecs are only available in HD (1920x1080) resolution.* *Note: In ARRIRAW mode, resolution is not available.* *Note: ALEXA HD and ALEXA HD Plus are limited to HD resolution, hence this entry is not shown.*
Quick format SxS CARD/Capture Drive	Select to format an **SxS PRO** card or XR Capture Drive. To complete the action, press both **FORMAT** buttons on the confirmation prompt. A quick format erases only the file allocation table.
Erase SxS CARD *Only available for* **SxS PRO** *cards*	Select to erase an **SxS PRO** card. To complete the action, press both **ERASE** buttons on the confirmation prompt. This action takes longer than the quick format, but ensures that all data on the card is erased. Erasing an **SxS PRO** card can increase its write speed.

Note: Before formatting or erasing an **SxS PRO** card, make sure the write-protect tab on the back edge of the **SxS PRO** card is disengaged. Do not engage or disengage the write-protect tab while the card is loaded in the **SxS** slot.

Note: Formatting or erasing an **SxS PRO** card or XR Capture Drive removes all data irreversibly from the card. Follow data management best practices to prevent loss of data.

If media without a valid file system is loaded in the camera, you will be prompted to format the media. ARRI recommends immediate formatting of media that trigger this warning.

Apple ProRes™ codecs

Apple ProRes™ codecs supported by the ALEXA:

Format	Sensor Mode	Reso-lution	Color Coding	Data Rate @ 24 fps[2]	Recording time on 64 GB SxS PRO @ 24 fps[2]	Recording time on XR Capture Drive @ 24 fps[2]
ProRes 422 (Proxy)	4:3	2048 x 1536	10 bit YCbCr	60 Mbit/s	139 min	513 min
	16:9	2048 x 1152	10 bit YCbCr	45 Mbit/s	186 min	687 min
	16:9	1920 x 1080	10 bit YCbCr	40 Mbit/s	211 min	780 min
ProRes 422 (LT)	4:3	2048 x 1536	10 bit YCbCr	130 Mbit/s	61 min	228 min
	16:9	2048 x 1152	10 bit YCbCr	100 Mbit/s	82 min	305 min
	16:9	1920 x 1080	10 bit YCbCr	90 Mbit/s	93 min	347 min
ProRes 422	4:3	2048 x 1536	10 bit YCbCr	190 Mbit/s	43 min	158 min
	16:9	2048 x 1152	10 bit YCbCr	140 Mbit/s	57 min	211 min
	16:9	1920 x 1080	10 bit YCbCr	125 Mbit/s	65 min	241 min
ProRes 422 (HQ)	4:3	2048 x 1536	10 bit YCbCr	280 Mbit/s	28 min	105 min
	16:9	2048 x 1152	10 bit YCbCr	210 Mbit/s	38 min	140 min
	16:9	1920 x 1080	10 bit YCbCr	185 Mbit/s	43 min	160 min
ProRes 4444[1]	4:3	2048 x 1536	12 bit RGB	425 Mbit/s	19 min	70 min
	16:9	2048 x 1152	12 bit RGB	320 Mbit/s	25 min	93 min
	16:9	1920 x 1080	12 bit RGB	280 Mbit/s	29 min	107 min

[1]Without alpha channel (444 only)

[2]Apple ProRes™ is a variable bit rate codec, meaning that the available recording time is subject to the image content. The number given in the table is the MINIMUM available recording time for a 32 GB card. When image content is easily compressed without loss of image quality, the available recording time may exceed the number given in the table.

Also note that the available recording time is listed for a 64 GB **SxS PRO** card at 24 fps. A lower sensor frame rate will increase the available recording time, while a higher sensor frame rate will decrease it.

For a detailed table of available frame rates and possible codec/card combinations, please refer to the Chapter *FPS* on page 70.

Avid DNxHD codecs

Note: On ALEXAs with XR module, DNxHD will be available again in a later SUP release.

Avid DNxHD codecs supported by the ALEXA (when the required license key is installed):

Format	Sensor Mode	Reso-lution	Color Coding	Data Rate @ 24 fps	Recording time on 64 GB SxS PRO @ 24 fps	Recording time on XR Capture Drive @ 24 fps
DNxHD 115/120/145	16:9	1920 x 1080	8 bit YCbCr	115 Mbit/s	72 min	255 min
DNxHD 175x/185x/220x	16:9	1920 x 1080	10 bit YCbCr	175 Mbit/s	48 min	170 min

DNxHD is a fixed bitrate codec. The codec naming convention indicates the codec's project frame rate:

- DNxHD 115 = 23.976/24 fps
- DNxHD 120 = 25 fps
- DNxHD 145 = 29.97 fps (30 fps is not available)
- DNxHD 175x = 23.976/24 fps
- DNxHD 185x = 25 fps
- DNxHD 220x = 29.97 fps (30 fps is not available)

For a detailed table of available frame rates and possible codec/card combinations, please refer to the Chapter *FPS* on page 70.

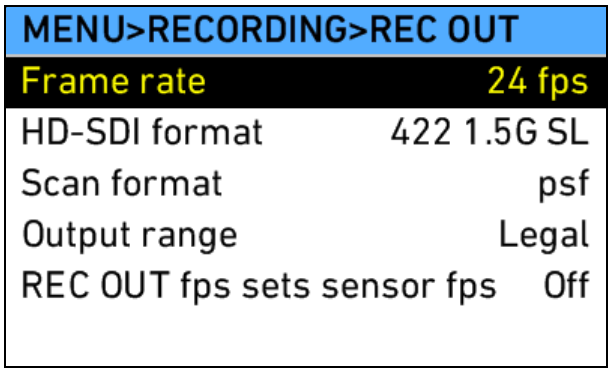
ARRIRAW

ALEXA cameras with XR module allow direct recording of ARRIRAW images internally to XR Capture Drives. Note that Codex Transfer Drives cannot be used for recording.

Format	Reso-lution	Color Coding	File size	Data Rate @ 24 fps	Recording time on XR Capture Drive @ 24 fps
4:3 ARRIRAW 2.8K	2880 x 2160	12 bit Bayer	9.3 MB	1.79 Gbit/s	35 min

16:9 ARRIRAW 2.8K	2880 x 1620	12 bit Bayer	7 MB	1.34 Gbit/s	47 min

REC OUT


MENU>RECORDING>REC OUT
Frame rate 24 fps
HD-SDI format 422 1.5G SL
Scan format psf
Output range Legal
REC OUT fps sets sensor fps Off

Select the REC OUT submenu to adjust parameters for recording to external recorders over the HD-SDI REC OUT outputs.

Note: Only use double shielded HD-SDI cables for recording to ensure error free data transmission!

Frame rate	Select to set the frame rate of the REC OUT outputs (independent of sensor frame rate).
HD-SDI format	Select to set the format of the REC OUT outputs (see below for details): • 422 (1.5G DL, 3G SL, 3G DL) • 444 (1.5G DL, 3G SL, 3G DL) • ARRIRAW (1.5G DL, 3G SL, 3G DL) • MON OUT clone *Note: ARRIRAW T-Link output is not available on ALEXA HD, ALEXA HD Plus and ALEXAs with XR module*
Scan format	Select to set the type of scan: • p: Progessive. Images are transmitted line by line from left to right, starting at the top-left pixel. • psf : Progressive segmented. Images are first split into fields, which are then transmitted line by line from left to right. *Note: Frame rates over 30 fps are only available in progressive scan. This complies with SMPTE standards.*

Output range	Select to set which bit range of the full 10 bit range (0-1023) is used to transmit image data. • Legal: Uses values 64-940 for RGB and Y signals, and values 64-960 for CbCr signals. This complies with SMPTE 274M 8.7. • Extended: uses values 4-1019, which results in about 10% more steps. This complies with SMPTE 274M 8.12 (called undershoot/overshoot). *Note: Check which mode your recorder supports. If you set the camera to extended, but your recorder only supports legal, you will end up with clipped images!*
REC OUT fps sets sensor fps	If set to "On", the sensor will always follow the REC OUT frame rate setting. This ensures no frames are dropped on the output.

Note: Both REC OUT and MON OUT carry a flag in their data stream to signal an external recorder that the camera has started or stopped recording internally. When internal recording is switched off, the REC button will only send the flag to trigger the external recorder—it will not start or stop internal recording. Additionally, the Vari flag marks duplicate images in the HD-SDI stream. A recorder that supports the Vari flag can detect these frames and discard them. This ensures that no duplicate frames are recorded if HD-SDI is set to a higher frame rate than the sensor.

HD-SDI formats and corresponding frame rates

Format	Links Used	Image Raster	Sampling Structure	Color Mode	Possible Frame Rates (fps)
422 1.5G SL	1	1920x1080	4:2:2	YCbCr	23.976, 24, 25, 29.97, 30
422 1.5G DL	2	1920x1080	4:2:2	YCbCr	48, 50, 59.94, 60
422 3G SL	1	1920x1080	4:2:2	YCbCr	48, 50, 59.94, 60
444 1.5G DL	2	1920x1080	4:4:4	RGB	23.976, 24, 25, 29.97, 30

444 3G SL	1	1920x1080	4:4:4	RGB	23.976, 24, 25, 29.97, 30
444 3G DL[1]	2	1920x1080	4:4:4	RGB	48, 50, 59.94, 60
ARRIRAW 1.5G DL[2]	2	2880x1620	Bayer	Bayer	23.976, 24, 25, 29.97, 30
ARRIRAW 3G SL[2]	1	2880x1620	Bayer	Bayer	23.976, 24, 25, 29.97, 30
ARRIRAW 3G DL[2]	2	2880x1620	Bayer	Bayer	48, 50, 59.94, 60
MON OUT clone[3]	1	1920x1080	4:2:2	YCbCr	23.976, 24, 25, 29.97, 30

[1]Proprietary signal format, as no SMPTE standard supports RGB 444 with frame rates higher than 30 fps. Only supported by some recorders.

[2]The RAW sensor image is transmitted wrapped as 1920x1080 RGBA. This signal can only be recorded with ARRIRAW T-Link certified recorders. Some recorders only support certain types of ARRIRAW T-Link.

[3]When in High Speed mode, REC OUT is always set to MON OUT clone.

30-60 fps recording with ALEXA over HD-SDI

Unlike the ARRIFLEX D-21, which used a proprietary mode for recording frame rates between 30-60 fps, the ALEXA complies with the SMPTE 372M standard for image transmission in 422 1.5G DL and 3G SL formats.

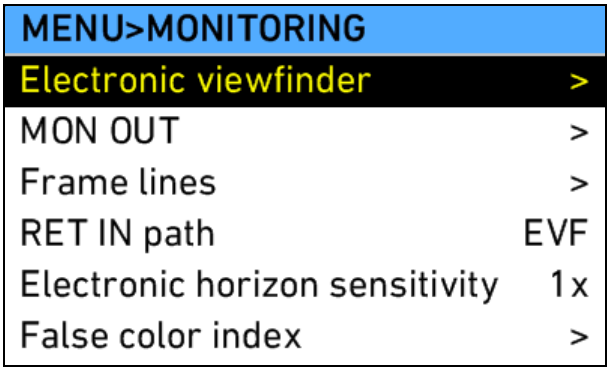
This means that images are split into fields, and every field is transmitted over one link. The second field of every image is transmitted over the other link, so that every link carries an interlaced signal in field integration mode. The recorder realigns the images correctly into a progressive sequence.

Two proprietary 3G DL formats allow transmission of 444 RGB or ARRIRAW images at frame rates between 30-60 fps. These formats do not comply to a SMPTE standard and are only supported by a few recorders. Please note the restrictions on ARRIRAW output mentioned above and refer to the manual of your recorder to see if it supports the desired format.

11.1.5.2 Monitoring

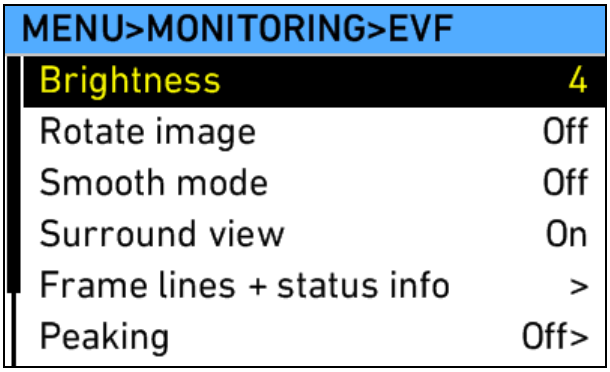
Select the Monitoring submenu to adjust parameters for monitoring on the EVF-1 and over the MON OUT output. These outputs are meant for monitoring and not recording.

Frame lines set in the Frame lines submenu apply to both MON OUT and EVF-1. Select the Electronic viewfinder and MON OUT submenus to switch the set frame lines on or off individually.



Electronic viewfinder	Select to adjust EVF-1 settings.
MON OUT	Select to adjust MON OUT settings.
Frame lines	Select to set up frame lines.
RET IN path	Select to set which of the monitoring output paths carries the signal at the RET IN connector as Return in active is toggled via a **USER** button.
Electronic horizon sensitivity	Select to adjust the sensitivity of the electronic horizon. *Note: Available on ALEXA Plus, ALEXA Plus 4:3, ALEXA Studio , ALEXA M, ALEXA XT Plus, ALEXA XT M, ALEXA XT Studio and ALEXA HD Plus only*
False color index	Select to open the FALSE COLOR INDEX screen which has a reference chart explaining the false color coding for EVF and MON OUT.

Electronic Viewfinder



Brightness	Select to adjust the brightness of the EVF.
Rotate image	When mounting the EVF to the right side of the camera, the image can be flipped to orient the image correctly in the viewfinder. Affects only the EVF image, MON OUT and recording images are not rotated.
Smooth mode	Select to set Smooth mode On or Off. With smooth mode on, the EVF image shutters less when panning. *Note: Smooth mode is only possible with frame rates up to 30 fps and shutter angles of 180.0 or less.*
Surround view	Select to set Surround view on the EVF-1 On or Off. When set to on, the additional pixels outside the recorded image area on the ALEXA's ALEV III sensor are displayed, allowing the operator to see outside the recorded image and keep unwanted objects, such as microphone booms, out of the shot. To view only the recorded image, set Surround view to off.
Frame lines + status info	Select to set frame lines, surround mask, center mark and status info overlays to On or Off in the EVF.
Peaking	Select to set peaking in the EVF to On or Off, and the strength of peaking to low, medium or high.
Anamorphic desqueeze	Select to set Anamorphic desqueeze to 1.3x, 2.0x and 2.0xmag. The desqueeze corrects the image for 1.3x and 2.0x anamorphic lenses. With 2.0x lenses, the user can choose between viewing the full sensor image (2.0x), or only the relevant image area (2.0xmag) where left and right sides of the EVF-1 image outside the 2.39 aspect area are cropped. *Only available if a license for anamorphic desqueeze is active in the camera.*
Zoom position	Select to set the Zoom position to Centered or Eye level. Press the **ZOOM** button on the EVF-1 to magnify: • Centered – the center of the image is magnified for focus check • Eye level – the image is magnified for focus check along a line approximately one third from the top, where an actor's eyes are commonly located in image composition.

Frame lines + status info screen

Frame lines	Select to set frame lines to On or Off. Frame lines are a reference for framing that typically consist of an image frame, a center mark and an aspect ratio reference. See the appendix for more information on the ALEXA frame line format.
Surround mask	Select to adjust the Surround mask settings. If surround view is set to "On", it must be separated from the recorded image area to allow proper framing. Users can choose: • Black line • Color line • Mask 25% • Mask 50% • Mask 100%
Center mark	Select to set the Center mark to Off, Small Dot*, Medium Dot or Cross to aid in image framing.
Status info	Select to set Status info to On or Off. When set to On, camera shooting parameters are displayed across the top of the EVF-1's image, outside the active image area and camera status information is displayed across the bottom of the EVF-1's image, outside the active image area.
Electronic horizon	Select to set the electronic horizon level to On or Off. *Only available on ALEXA Plus, ALEXA Plus 4:3, ALEXA Studio, ALEXA M, ALEXA XT Plus, ALEXA XT M, ALEXA XT Studio and ALEXA HD Plus.*
LDS info	Overlay showing LDS lens info. *Only available on ALEXA Plus, ALEXA Plus 4:3, ALEXA Studio, ALEXA M, ALEXA XT Plus, ALEXA XT M, ALEXA XT Studio and ALEXA HD Plus.*

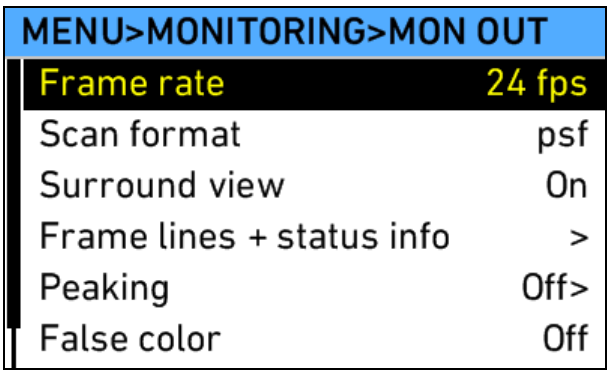
* Valid for SUP 8.1 (ALEXA XT/XR) but not SUP 8.0 (ALEXA Classic)

MON OUT

The MON OUT is a 422 1.5G single link HD-SDI output. The output range is fixed at legal range.

Frame rate	Select to set the MON OUT frame rate to 23.976, 24, 25, 29.97 or 30 fps. The frame rate should, if possible, match the sensor frame rate to avoid dropped frames or duplicate frames on the output, which would result in jittery images during camera movement or when image subjects are moving.
Scan format	Select to set the type of scan: • p: Progessive. Images are transmitted line by line from left to right, starting at the top-

	left pixel. • psf: Progressive segmented. Images are first split into fields, which are then transmitted line by line from left to right.
Surround view	Select to set Surround view on the MON OUT On or Off. When set to on, the additional pixels outside the recorded image area on the ALEXA's ALEV III sensor are displayed, allowing the operator to see outside the recorded image and keep unwanted objects, such as microphone booms, out of the shot. To view only the recorded image, set Surround view to off.
Frame lines + status info	Select to set frame lines, surround mask, center mark and status info overlays to On or Off on the MON OUT.
Peaking	Select to set peaking on the MON OUT to On or Off, and the strength of peaking to low, medium or high.
False color	Select to activate the false color display on the MON OUT. The false color display is an exposure tool that overlays the image with color coding to highlight areas with significant luminance values.
Anamorphic desqueeze	Select to set Anamorphic desqueeze to 1.3x, 2.0x and 2.0xmag (only available if a license for anamorphic desqueeze is active in the camera). The desqueeze corrects the image for 1.3x and 2.0x anamorphic lenses. With 2.0x lenses, the user can choose between viewing the full sensor image (2.0x), or only the relevant image area (2.0xmag) where left and right sides of the MON OUT image outside the 2.39 aspect area are cropped. *Only available if a license for anamorphic desqueeze is active in the camera.*



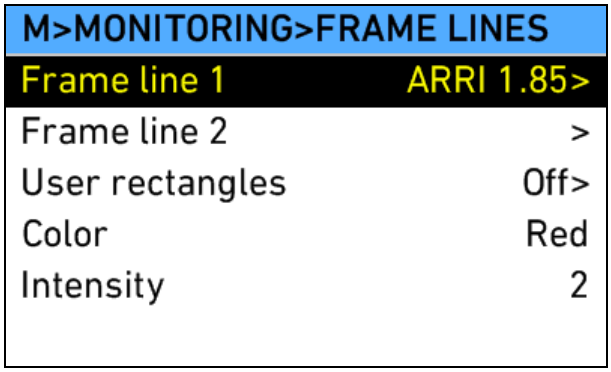
Note: Only use double shielded HD-SDI cables for monitoring to ensure error free data transmission!

Frame lines + status info screen

Frame lines	Select to set frame lines to On or Off. Frame lines are a reference for framing that typically consist of an image frame, a center mark and an aspect ratio reference. See the appendix for more information on the ALEXA frame line format.
Surround mask	Select to adjust the Surround mask settings. If surround view is set to "On", it must be separated from the recorded image area to allow proper framing. Users can choose: • Black line • Color line • Mask 25% • Mask 50% • Mask 100%
Center mark	Select to set the Center mark to Off, Small Dot*, Medium Dot or Cross to aid in image framing.
Status info	Select to set Status info to On or Off. When set to On, camera shooting parameters are displayed across the top of the MON OUT image, outside the active image area and camera status information is displayed across the bottom of the MON OUT image, outside the active image area.
Electronic horizon	Select to set the electronic horizon level to On or Off. *Only available on ALEXA Plus, ALEXA Plus 4:3, ALEXA Studio, ALEXA M, ALEXA XT Plus, ALEXA XT M, ALEXA XT Studio and ALEXA HD Plus.*
LDS info	Select to set the LDS lens information overlay to On or Off. *Only available on ALEXA models with LDS lens mount.*
Camera index letter	Select to display the camera index letter in the top right corner of the MON OUT image.

* Valid for SUP 8.1 (ALEXA XT/XR) but not SUP 8.0 (ALEXA Classic)

Frame Lines



Frame lines are an image overlay that can be applied to either the EVF image, the MON OUT image, or both.

ALEXA frame lines are stored as XML files that define the frame lines' aspect ratio, marker style, line width, center marker and more. The color of the frame lines is set on the camera.

The following default frame lines are loaded onto the ALEXA:

- 1.33:1
- 1.66:1
- 1.78:1
- 1.85:1
- 2.39:1
- 2.39:1 2.0x anamorphic

Additional frame lines can be loaded from the SD card. To create additional frame lines, use ALEXA Frameline Composer, a free web tool at http://www.arri.com/camera/digital_cameras. Save the new frame lines as XML files to an SD card formatted on the ALEXA, in the Frame lines folder. The ALEXA supports up to 16 frame line templates.

To load additional frame lines:

1. In the FRAME LINES menu, select Frame line 1 (or Frame line 2).
2. Press the **ADD** button.
3. On the FRAME LINES (SD CARD) screen, use the jogwheel to select the frame line you wish to add.
4. Press the jogwheel to add it to the FRAME LINES list.
5. Using the jogwheel, select the new frame line in the FRAME LINES list.
6. Press the jogwheel to set the new frame line.

Frame line 1	Select to set the primary frame line template.
Frame line 2	Select to set a secondary frame line, if desired.
User rectangles	Select to open the User rectangles menu, where two custom user rectangle overlays can be adjusted.

Color	Select to set the color of the frame lines. In the frame lines definition file, lines can either be given a fixed color, or they can have the color specified as "User". If "User" is chosen for a line, the setting chosen in this menu section is applied to the line.
Intensity	Select to set the intensity of the frame lines. The higher the number, the brighter the frame lines appear.

User rectangles screen

User rectangles	Select to set user rectangles to Off, Rect 1, Rect 2 or Rect 1&2. The ALEXA can display up to two additional rectangles that can be adjusted manually.
Set rect 1	Select to set the shape of rectangle 1. Activate it through User rectangles.
Set rect 2	Select to set the shape of rectangle 2. Activate it through User rectangles.

Note: Default frame lines have "User" specified as color for all content.

False Color Index

Select False color index to display a reference chart showing the relationship between the color overlays, signal level in percent and descriptions. False color is available on the EVF-1 and over the MON OUT outputs.

What	Signal Level	Color
White clipping	100% - 99%	red
Just below white clipping	99% - 97%	Yellow
One stop over medium gray (Caucasian skin)	56% - 52%	pink
18% medium gray	42% - 38%	green
Just above black clipping	4.0% - 2.5%	blue
Black clipping	2.5% - 0.0%	purple

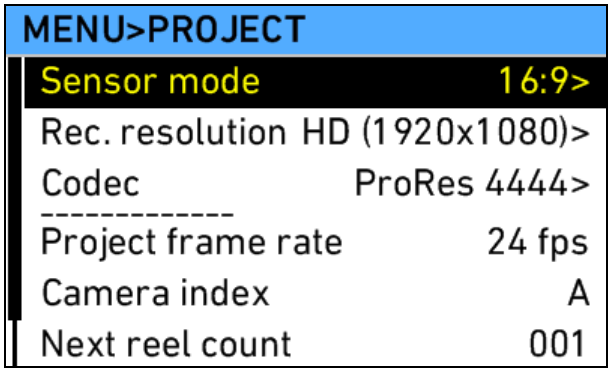
Figure 74: False Color Encoding

11.1.5.3 Project

Sensor mode	Select to set which sensor mode is active, 4:3 or 16:9. *Note: Only on ALEXA Plus 4:3, ALEXA Studio, ALEXA M, ALEXA XT, ALEXA XT Plus, ALEXA XT M and ALEXA XT Studio.*

Rec. resolution	Select to set the current recording resolution. Links to MENU>Recording>Internal. *Note: Not shown on ALEXA HD and ALEXA HD Plus, as resolution is fixed to HD.*
Codec	Select to set the current recording codec. Links to MENU>Recording>Internal. *Note: When internal recording is switched off, the currently active REC OUT format is shown.*
Project fps	Select to set the timebase of the time code, which determines how many frames the time code counts per second and the frame rate of clips recorded internally during playback.
Camera index	Select to set the camera indentifier. Identifies the individual camera unit in clips and is reflected in clip names recorded internally.
Next reel count	Select to set the reel number assigned to the next new media used for internal recording. The ALEXA automatically advances the reel number every time new media is formatted on the camera. The reel number is reflected in clip names on media.
Production info	Select to open the PRODUCTION INFO screen where the user can enter metadata information specific to the production.

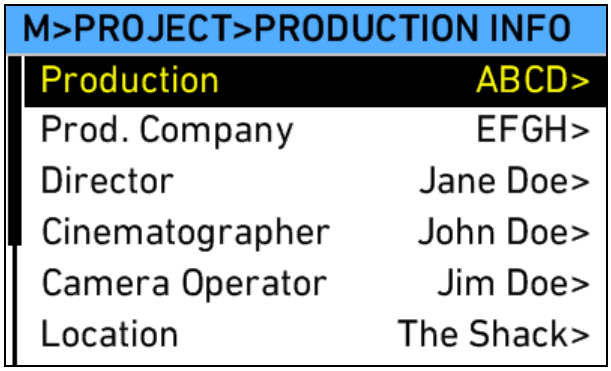
Note: The user should set the value of the Next reel count to 001 at the beginning of a shoot.

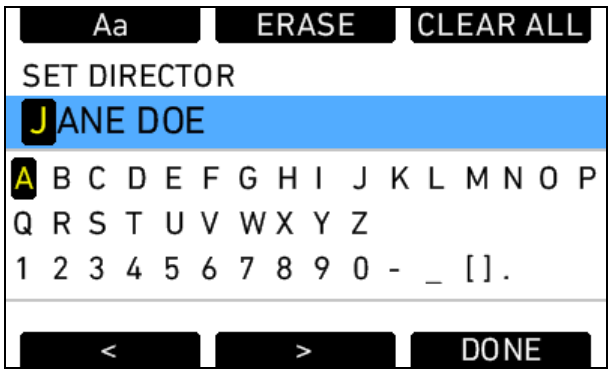


Production Info

The PRODUCTION INFO screen has fields to enter metadata information specific to the production. The user can enter the names of the director, cinematographer, location, production, scene and take. Two additional fields allow to enter other data.

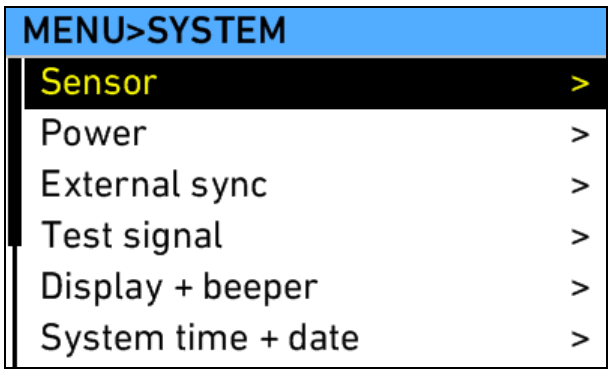
Production	Enter the name of the production
Prod. Company	Enter the name of the production company
Director	Enter the name of the director
Cinematographer	Enter the name of the cinematographer
Camera Operator	Enter the name of the camera operator
Location	Enter the name of the location
Scene	Enter the name/number of the scene
Take	Enter the name/number of the take
User Info 1	Enter other info
User Info 2	Enter other info





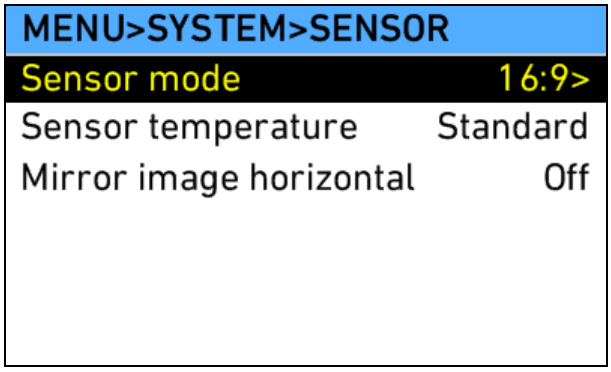
11.1.5.4 System

The System menu contains submenus of system settings.



Sensor

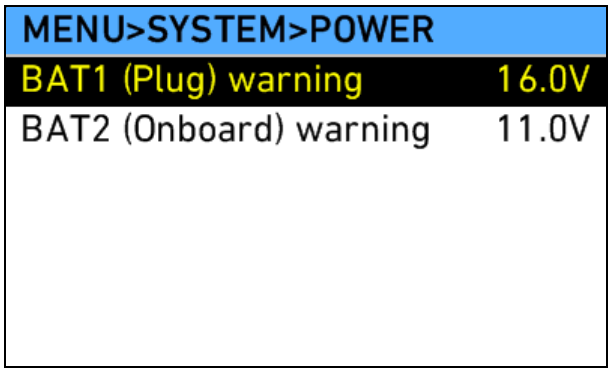
Sensor temperature	Select to set the sensor temperature to Standard (default) humidity or High humidity. When shooting in tropical conditions with high temperature and high humidity, the sensor temperature can be changed from Standard to High humidity to prevent condensation from forming on the sensor coverglass.
Mirror image horizontal	Select to mirror the image horizontally on all image paths.



Power

BAT1 (Plug) warning	Select to adjust the voltage level at which a power warning is displayed for the power source connected to the BAT plug. The level can be adjusted to match the battery type used. The default value is 21.0V.
BAT2 (Onboard) warning	Select to adjust the voltage level at which a power warning is displayed for the onboard battery. The level can be adjusted to match the battery type used. The default value is 12.0V.

Note: When the voltage level reaches a point 10% below the warning level set in the POWER menu, the ALEXA displays a battery error message and recording is unavailable. The camera will read the voltage level as insufficient.



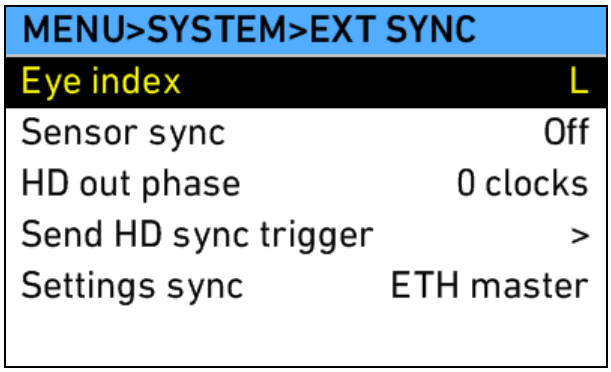
Smart batteries that transmit their remaining load to the camera emit a warning at 10% remaining capacity and an error at 5% remaining capacity. Currently, batteries made by ID-X, Bebop, Anton Bauer and any battery using the TI-protocol support this feature.

External Sync

Note: This functionality is not available on ALEXA HD and ALEXA HD Plus.

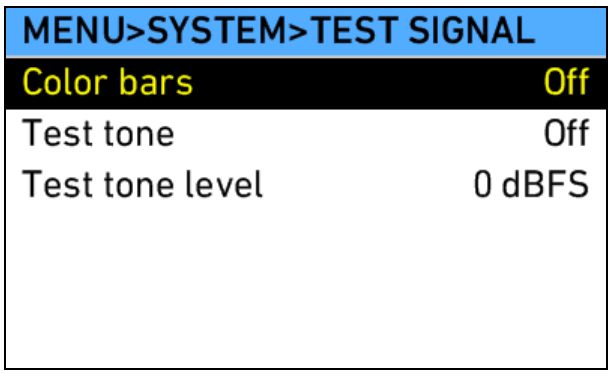
Eye index	Select to set the Eye index to left (L) or right (R). The first letter of the Camera ID will be changed to L or R for stereoscopic productions to identify left and right eye cameras. The eye index is reflected in clip names recorded internally.
Sensor sync	Select to sync the sensors of two ALEXAs. See *Sensor sync* (on page 155) for more information. • Off: The camera is in non-synced mode for regular use. • EXT master: The camera sends signals to an EXT SLAVE camera via the EXT connector containing sync clock and TC signals. • EXT slave: The camera receives signals from an EXT MASTER camera containing sync clock and TC signals through the EXT connector.
HD out phase	Select to adjust the phase of the REC OUT output in the range of -30 to +30 HD clocks (1 HD clock = 13.4 ns). This can be necessary for 3D applications with external recorders that require the slave signal to arrive after the master signal. Shift the phase backwards (+) on a slave camera or forwards (-) on a master camera to achieve the correct signal order.
Send HD sync	When using two cameras in sensor sync mode

trigger	without settings sync, the EXT MASTER camera must send a trigger to the EXT SLAVE camera to ensure the HD outputs of the cameras are synced. Press the jogwheel to send the trigger.
Settings sync	ALEXA cameras can be operated in synced-settings mode, where the settings of two cameras can be synced via Ethernet. See *Settings sync* (on page 156) for more information.



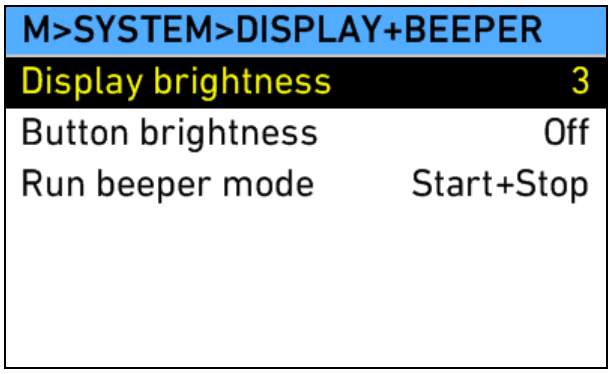
Test Signal

Color bars	Select to activate SMPTE color bars on MON OUT and REC OUT. The color bars are a 10-bit signal according to SMPTE RP 219-2002. *Note: Color bar is switched off when recording is started.* *Note: When REC OUT is set to ARRIRAW, REC OUT is set to black while color bar is active.*
Test tone	Select to activate a 1 kHz audio test tone on all channels when color bar is active. *Note: Test tone is only active when audio recording is on and possible.*
Test tone level	Select to sets the level of the audio test tone to 0 dbFS, -9 dBFS or -18 dBFS.



Display + Beeper

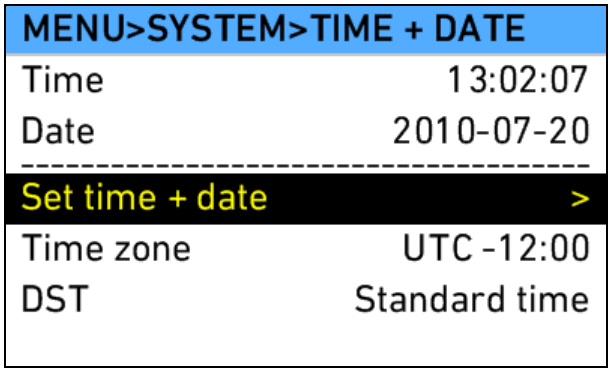
Display brightness	Select to adjust the brightness of the LCD display on the camera-right side. To adjust the display brightness when the HOME screen is displayed, press and hold the **BACK** button while rotating the jogwheel.
Button brightness	Select to adjust the brightness of the button illumination.
Run beeper mode	Select to set the Run beeper mode to: • Off • Start • Stop • Start+Stop



System Time + Date

Time	Displays the current time (read-only).
Date	Displays the current date (read-only).
Set time + date	Select to set time and date.
Time zone	Select to set the time zone to match your current location.
DST	Select to set daylight savings time.

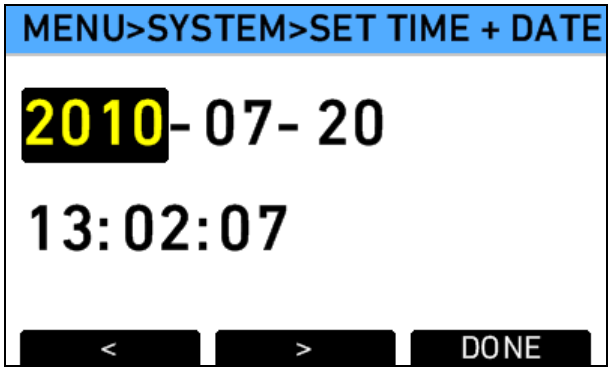
Set time + date



Use the lower screen buttons to navigate between the elements in the screen and to finish your setting.

To set the time and date:

1. In the System menu, select System time + date.
2. Select Set time + date.
3. Use the jogwheel to adjust the date value, starting with the year.
4. Press the > button to jump to the month, day, hour, minute and second. Press the < button to jump back one step.
5. Press the **DONE** button when finished.



Fan

Fan mode	Select to set the fan mode to Regular for locations with ambient temperatures up to 30°C (86°F). For locations with ambient temperatures higher than 30°C (86°F), set to Rec low. When the fan is set to Rec Low, it will run at a high rate when the camera is in Standby, and run at a low rate when the camera is recording.

SD card

Format + prepare SD card	Select to format the SD card and creates the required folder structure after confirmation. *Note: This erases all data present on the SD card.*

Prepare SD card	Select to create or complete the required folder structure on the SD card without erasing any data present on the SD card.

Firmware - Software Update Packets (SUPs)

To keep the ALEXA up to date with new features, the camera firmware can be updated by the user. Download the latest Software Update Packet (SUP) from http://www.arri.com/camera/digital_cameras and be sure to read the included instructions.

Please note that from version 8.0 on, Software Update Packets (SUPs) for ALEXA Classic cameras with the **SxS** Module are different from SUPs for ALEXA XT cameras and ALEXA Classic cameras that have been upgraded with the XR Module. SUPs for ALEXA Classic cameras with the **SxS** Module will be called "SUP X.Y (ALEXA Classic)". SUPs for ALEXA XT cameras and ALEXA Classic cameras that have been upgraded with the XR Module will be called "SUP X.Y (ALEXA XT/XR)".

Note: ARRI discourages downgrading cameras to lower SUP versions. Be sure to carefully read the release notes of the currently installed SUP to find out if downgrading is possible, and ask your ARRI service center if in doubt.

To update the camera to a new SUP:

1. Copy the new SUP into the Firmware folder on an SD card formatted in the ALEXA.
2. Load the SD card into the camera.
3. In the System menu, select Firmware.
4. Select Select update file.
5. Select the new SUP from the list on the FIRMWARE (SD CARD) screen.
6. Press both **UPDATE** buttons simultaneously to update the camera's firmware.

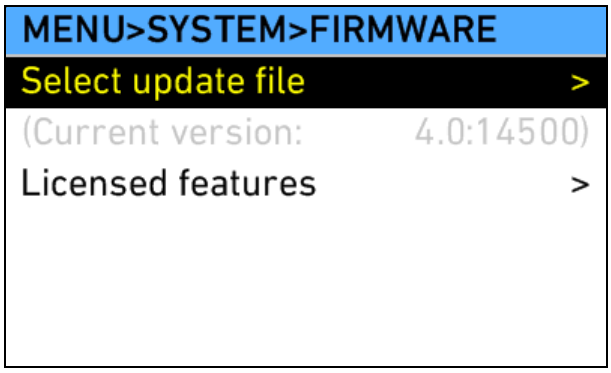
Note: Do not interrupt the update once it has started. Make sure the camera power supply will remain sufficient for the duration of the update (approx. 15 minutes).

Select update file	Select to update the camera’s firmware. If an SD card containing update files is loaded in the camera, you can select an update file from the list and perform an update.
Current version	Select to display the release code of current installed firmware.
Licensed features	Select to manage licensed features on the INSTALLED LICENSES screen.

Note: On rare occasions, the update process can fail. If the update procedure

fails, try it again until you succeed.

Note: If internal recording is switched off, switch it back on again before performing a firmware update.



Licensed Features

The capabilities of the ALEXA can be further enhanced through licensed features available for online purchase. Visit the ALEXA LICENSE SHOP at http://alshop.arri.de and follow the instructions for purchasing and downloading license keys. Available licenses include:

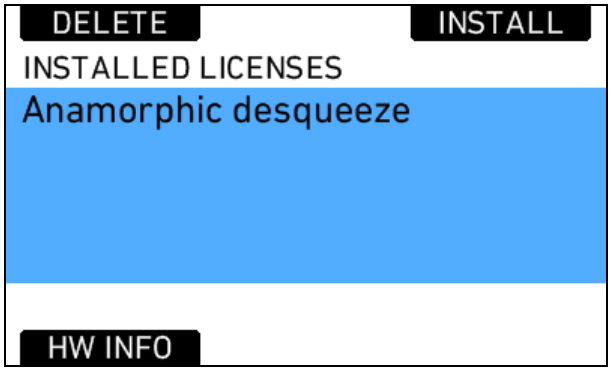
- DNxHD License Key
- High Speed License Key
- Anamorphic De-squeeze License Key

License keys are linked to each ALEXA's serial number and cannot be transferred from one camera to another. Before purchasing a license key, you must save the camera's hardware info file for upload during the purchasing process.

To save the hardware info file:

1. In the System menu, select Firmware.
2. Select Licensed features.
3. On the INSTALLED LICENSES screen, press the **HW INFO** button.
4. Press the **SAVE** button. The hardware info file will be saved on the SD card in the root directory. It will look like *sn####-AlexaHardware.ipkg*.

The INSTALLED LICENSES screen displays a list of installed licenses. New license can be installed from the SD card.



To install new licenses after purchase:

1. Copy the license key—it will have the suffix .lic—into the Licenses folder on an SD card formatted on the ALEXA. Load the SD card into the camera.
2. In the System menu, select Firmware.
3. Select Licensed features.
4. Press the **INSTALL** button.
5. On the LICENSE FILES (SD CARD) screen, select the license to be installed. The licensed feature enabled by the license key is described at the bottom of the screen for each license selected.
6. Press the jogwheel to install the license.

Note: Only license keys that have been created for the camera in use will appear in the SD card license list.

License keys can be deleted from the camera to prevent the use of the feature. The license can be reinstalled at any time.

To delete a license:

- On the INSTALLED LICENSES screen, press the **DELETE** button.
- Use the jogwheel to select the license you wish to delete.
- Press both **DELETE** buttons simultaneously.

Note: Keep an offline copy of the license key in a secure place! In the event of a lost license key, you can re-download it from your account in the ALEXA LICENSE SHOP.

11.1.5.5 Frame grabs

Still frames from the camera's sensor can be taken. The still images inherit the REC OUT gamma and Look File settings. Available still image formats include .jpg, .tif and .dpx when the REC OUT is set to 422 or 444 output formats. When the REC OUT acts as a MON OUT clone, frame grabbing is not available.

To set the still frame format:

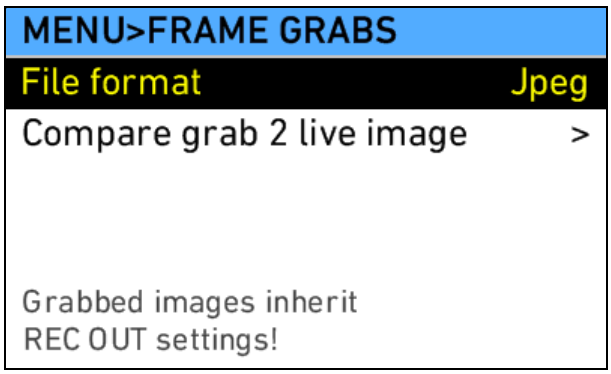
1. In the Frame grabs menu, select File format.
2. Use the jogwheel to select the desired format and press the jogwheel to set it. Unavailable formats are grayed out.

To take a still frame and save it to the SD card:

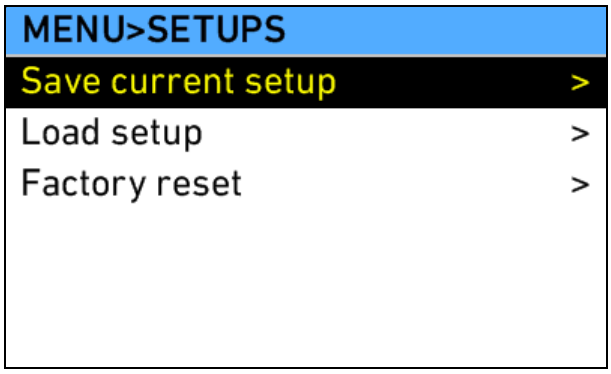
- Press the **GRAB** button. The time needed for saving the image to the SD card will vary, depending on the file format. Additional still frames may not be taken while saving.

Still frames can also be taken by assigning User buttons **1**, **2** or **3** to Grab still frame. This allows still frames to be taken from the operator's side of the camera (camera-left side).

Still frames will be saved in the Grabs folder on the SD card.



11.1.5.6 User Setups



A user setup is a profile of the current settings on the ALEXA that can be saved to the SD card. User setups can be given custom names, saved to the SD card and loaded onto multiple ALEXAs.

Rather than resetting the camera to its factory default settings, a user setup can be used to reset the camera to a user's default settings.

A user setup contains all parameters set in the camera except files that have been transferred via SD card, specifically frame lines and ARRI Look Files. These are not affected by loading a user setup and are only cleared by performing a factory reset.

Requirements:

- formatted SD card loaded in the SD card slot on the ALEXA

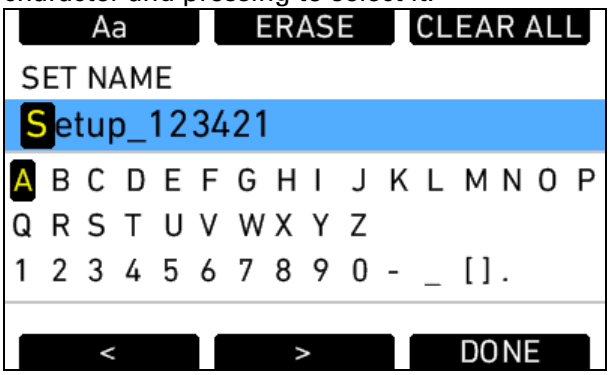
To create a user setup:

- Set all the desired parameters on the ALEXA.

To save a user setup:

1. Press the **MENU** button.
2. Use the jogwheel to select User Setups.
3. Select Save current setup.

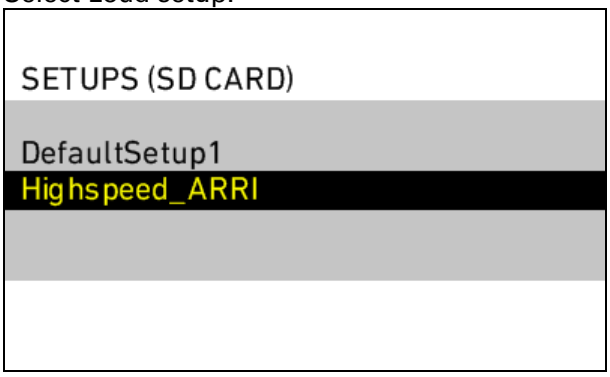
4. To apply a custom name to your user setup, press the **RENAME** button. Erase the default user-setup name by pressing the **CLEAR ALL** button.
5. Use the jogwheel to enter a new name by scrolling to the desired character and pressing to select it.



6. When you have finished entering the new user setup name, press the **DONE** button.
7. Press the jogwheel to save the new user setup to the SD card.

To load a user setup:

1. Press the **MENU** button.
2. Use the jogwheel to select User Setups.
3. Select Load setup.



4. Use the jogwheel to select the desired setup in the list and press the jogwheel to load the setup.
5. Press the **PROJECT** button to validate your project settings.

Note: User setups work only in the SUP version they are created in. After a SUP update, a new user setup must be created and saved.

A recommended procedure for working with user setups is as follows:

1. Before shooting, perform a factory reset to restore factory default settings.
2. Save a user setup named "Reset" or similar. This will be used instead of performing the ALEXA's factory reset.
3. Adjust the camera's shooting parameters and settings, and load the desired frame lines and ARRI Look Files.

4. Save another user setup with a descriptive name, such as "Show Title A-Cam".
5. To reset the camera to the default settings without losing the frame lines or ARRI Look Files, load the "Reset" user setup.

User setups can be used to ensure that cameras on multi-camera shoots have matching settings, or to transfer a show's setup onto daily cameras, to ensure they carry the same shooting specifications. User setups can also be created for regular speed and high speed modes, eliminating the need to change settings individually after switching modes. For example, to switch from regular speed mode to high speed mode, the user can simply load the high-speed mode user setup that he created, saving production time.

Note: You cannot switch between sensor modes by loading a user setup. To switch sensor modes, go to the SENSOR menu or PROJECT menu.

11.2 Operator controls

The operator controls are located on the camera left side and consist of three function buttons plus three assignable buttons.

1	User button 1. Can be assigned functions with the **USER** button on the Main controls.
2	User button 2. Can be assigned functions with the **USER** button on the Main controls.
3	User button 3. Can be assigned functions with the **USER** button on the Main controls.
REC	Press the **REC** button to start and stop internal recording. A red LED tally indicates recording.
PLAY	Press the **PLAY** button once to load the last clip. Press the **PLAY** button again to toggle between play and pause. Press and hold the **PLAY** button for 2 seconds to stop playback.
LOCK	Press and hold the **LOCK** button for 3 seconds (counted down on the main controls LCD) to lock the main and operator controls. A blue LED beside the **LOCK** button on the camera-left side indicates the lock is active. A lock icon on the LCD display on the camera-right side indicates the lock is active. Press and hold the **LOCK** button for 3 seconds to unlock the main and operator controls.

Figure 75: Operator UI

11.3 EVF-1 Controls

The EVF-1 controls are located on the electronic viewfinder. They consist of a number of function buttons and a jogwheel.

CAM	Press the CAM button to open the EVF-1's CAM menu.
EVF	Press the EVF button to open the EVF-1's EVF menu.
ZOOM	Press the **ZOOM** button to magnify the EVF-1 image 2.25x for focus check. The magnification ratio is 1:1, or one sensor pixel to one EVF-1 display pixel. Active magnification is indicated by an orange frame around the image. Frame lines are deactivated while zoom is active.
EXP	Press the EXP button (EXP = EXPOSURE) to toggle false color display on and off.

When the **LOCK** button on the main controls is engaged, the CAM and EVF buttons are locked with the main controls and operator controls. The **ZOOM** and **EXP** buttons are not affected by the lock.

The message "Button is locked!" is displayed in the EVF-1 when the **CAM** or **EVF** button is pressed while the main controls are locked.

11.3.1 Viewfinder EVF menu

Press the **EVF** button to open the Viewfinder EVF menu in the EVF-1 display and set the viewfinder parameters. Use the jogwheel on the EVF-1 to select and set menu options. Press the **EVF** button to exit the Viewfinder EVF menu.

Brightness	Select to set the brightness of the EVF from 1 (least bright) to 5 (brightest). A brightness level of 5 is recommended for normal shooting scenarios.
Rotate image	When mounting the EVF to the right side of the camera, the image can be flipped to orient the image correctly in the viewfinder. Affects only the EVF image, MON OUT and recording images are not rotated.
Smooth mode	Select to set Smooth mode On or Off. With smooth mode on, the EVF image shutters less when panning. *Note: Smooth mode is only possible with frame rates up to 30 fps and shutter angles of 180.0 or less.*
Surround view	Select to set Surround view on the EVF-1 On or Off. When set to on, the additional pixels outside the recorded image area on the ALEXA's ALEV III sensor are displayed, allowing the operator to see outside the recorded image and keep unwanted objects, such as microphone booms, out of the shot. To view only the recorded image, set Surround view to off.
Surround mask	Select to adjust the Surround mask settings. If surround view is set to On, it must be separated from the recorded image area to

	allow proper framing. Users can choose: • Black line • Color line • Mask 25% • Mask 50% • Mask 100%
Status info	Select to set Status info to On or Off. When set to On, camera shooting parameters are displayed across the top of the EVF-1's image, outside the active image area and camera status information is displayed across the bottom of the EVF-1's image, outside the active image area.
Framelines	Select to set frame lines to On or Off. Frame lines are a reference for framing that typically consist of an image frame, a center mark and an aspect ratio reference. See the appendix for more information on the ALEXA frame line format.
Select framelines 1	Select to set the main frame lines template from those stored in the camera.
Select framelines 2	Select to set the secondary frame lines template from those stored in the camera.
Center mark	Select to set the Center mark to Off, Small Dot*, Medium Dot or Cross to aid in image framing.
User rectangles	Select to display up to two additional user-editable rectangles in the EVF-1 image.
Edit user rectangles	Select to adjust the user rectangles.
Framelines color	Select to set the color of the frame lines.
Framelines intensity	Select to set the brightness of the frame lines.

* Valid for SUP 8.1 (ALEXA XT/XR) but not SUP 8.0 (ALEXA Classic)

11.3.2 Viewfinder CAM menu

Press the **CAM** button to open a the Viewfinder CAM menu in the EVF-1 display and set the camera parameters. Use the jogwheel on the EVF-1 to select and set menu options. Press the **CAM** button to exit the Viewfinder CAM menu.

FPS	Select to set the sensor frame rate. Preconfigured and previously added user-defined values can be selected in the FPS list.
SHUTTER	Select to set the shutter angle. Preconfigured and previously added user-defined values can be selected in the Shutter list.

EI	Select to set the exposure index. Settings from EI 160 to EI 3200 can be selected, in steps of 1/3 stop.
WB	Select to set the white balance. Preconfigured and previously added user-defined values can be selected in the WB list.

12 Operation of the Camera

This chapter covers tasks the user will encounter while using the ALEXA. While previous chapters contained specific procedures for basic use, this chapter will outline broader tasks and offer recommendations and best practices, including camera configuration.

12.1 Recording

12.1.1 Internal recording

This chapter contains information and recommendations for internal recording. The user is encouraged to adapt the recommendations and workflow to individual and production needs.

Note: ARRI cannot be held responsible for the loss of any data in conjunction with internal recording!

ALEXA cameras can be equipped with an **SxS** Module or the new XR Module for internal recording. The XR Module is a camera side panel that was co-developed with Codex, offering in-camera ARRIRAW, ProRes, and DNxHD recording up to 120 fps onto the exceptionally fast XR Capture Drives. The new recording module replaces the **SxS** Module for all new ALEXA XT models and is available as an upgrade for all ALEXA Classic cameras. Cameras that are upgraded with an XR Module will no longer output ARRIRAW over HD-SDI T-Link.

Note: DNxHD recording not possible with XT cameras and ALEXA Classic cameras with the XR Module upgrade as of SUP 8.0 (ALEXA XT/XR); planned for SUP 9.0 (ALEXA XT/XR). DNxHD is possible with ALEXA Classic cameras with SUP 7.x and SUP 8.x (ALEXA Classic).

12.1.1.1 SxS Module

The classic ALEXA models with an SxS Module use Sony **SxS PRO** cards for internal recording. **SxS PRO** cards have an ExpressCard34 form factor and are available with a storage capacity of 8, 16, 32 and 64 GB.

File System

SxS PRO cards need to be formatted in the camera before they can be used for recording. The ALEXA initializes **SxS PRO** cards with the Universal Disk Format (UDF) file system. This file system is read-only for computers, which means data can be copied from the card to another device, but the data cannot be manipulated on the card itself and no data can be added to the card.

12.1.1.2 XR Module

ALEXA XT cameras and ALEXA Classic cameras that were upgraded with an XR Module can use XR Capture Drives or Sony **SxS PRO** cards for internal recording. Using **SxS PRO** cards requires an **SxS** Adapter from ARRI and does not allow recording ARRIRAW data.

The XR Capture Drives are equipped with fast and reliable SSDs. They share the same small, rugged aluminum housing and mechanical interface as the Codex Onboard S Capture Drives and Transfer Drives. XR Capture Drives can be accessed with standard Codex docking stations.

File System

Depending on the recording format, XR Capture Drives are initialized with different file systems. XR Capture Drives can be formatted in the XR Module or using Codex Software (Mac only) in a Codex Single Dock, Dual Dock, or the standalone Codex Vault.

When the camera is set to ARRIRAW recording, an XR Capture Drive is initialized as a Codex volume, which offers 455 GB of storage space. This allows for 47 minutes of 16:9 ARRIRAW recording at 24 fps or 9 minutes of ARRIRAW at 120 fps. The file system is read-only for computers.

When the camera is set to ProRes 2K/HD or DNxHD recording, it uses one SSD in the XR Capture Drive and initializes it as a UDF volume. This offers 229 GB of storage space, which equals over 100 minutes of 16:9 ProRes 4444 in 2K or three hours of ProRes 422 HQ at 24 fps. The file system is read-only for computers.

SxS Pro cards can only be used for ProRes 2K/HD or DNxHD recording. These cards are always initialized with the UDF file system and have to be formatted in the XR Module with the **SxS** Adapter.

12.1.1.3 Internal Recording Formats

ALEXA footage can be captured as QuickTime movies using an Apple ProRes™ codec, as MXF files using an Avid DNxHD codecs, or – with an XR Module – as unencrypted and uncompressed ARRIRAW file sequences.

Notes: Recording in Avid DNxHD requires a license key and is not available on ALEXAs with XR module with SUP 8.0. It will be available again in a later SUP version. Recording ARRIRAW internally requires the XR Module and does not work with **SxS PRO** cards.

ProRes

ALEXA has been the first camera offering internal, ready-to-edit, QuickTime/ProRes HD recording to **SxS PRO** cards. With SUP 7.0, all cameras received a free upgrade enabling QuickTime/ProRes 2K recording. Recording in ProRes 2K is a cost-efficient alternative to shooting ARRIRAW, as it requires less storage space and no processing, but at the same time delivers an image quality that is superior to that of up-scaled HD material. With the option to capture ProRes 2K in the 4:3 aspect ratio, the format offers true anamorphic capture with regular 2:1 anamorphic lenses and offers extra room for repositioning when using standard spherical lenses.

Note: 4:3 ProRes 2K is available on all ALEXA XT models and ALEXA Plus 4:3, ALEXA Studio and ALEXA M.

Format	Sensor Mode	Reso-lution	Color Coding	Data Rate @ 24 fps[2]	Recording time on 64 GB SxS PRO @ 24 fps[2]	Recording time on XR Capture Drive @ 24 fps[2]
ProRes 422 (Proxy)	4:3	2048 x 1536	10 bit YCbCr	60 Mbit/s	139 min	513 min
	16:9	2048 x 1152	10 bit YCbCr	45 Mbit/s	186 min	687 min
	16:9	1920 x 1080	10 bit YCbCr	40 Mbit/s	211 min	780 min
ProRes 422 (LT)	4:3	2048 x 1536	10 bit YCbCr	130 Mbit/s	61 min	228 min
	16:9	2048 x 1152	10 bit YCbCr	100 Mbit/s	82 min	305 min
	16:9	1920 x 1080	10 bit YCbCr	90 Mbit/s	93 min	347 min
ProRes 422	4:3	2048 x 1536	10 bit YCbCr	190 Mbit/s	43 min	158 min
	16:9	2048 x 1152	10 bit YCbCr	140 Mbit/s	57 min	211 min
	16:9	1920 x 1080	10 bit YCbCr	125 Mbit/s	65 min	241 min
ProRes 422	4:3	2048 x 1536	10 bit YCbCr	280 Mbit/s	28 min	105 min

(HQ)	16:9	2048 x 1152	10 bit YCbCr	210 Mbit/s	38 min	140 min
	16:9	1920 x 1080	10 bit YCbCr	185 Mbit/s	43 min	160 min
ProRes 4444[1]	4:3	2048 x 1536	12 bit RGB	425 Mbit/s	19 min	70 min
	16:9	2048 x 1152	12 bit RGB	320 Mbit/s	25 min	93 min
	16:9	1920 x 1080	12 bit RGB	280 Mbit/s	29 min	107 min

[1]Without alpha channel (444 only)

[2]Apple ProRes™ is a variable bit rate codec, meaning that the available recording time is subject to the image content. The number given in the table is the MINIMUM available recording time for a 32 GB card. When image content is easily compressed without loss of image quality, the available recording time may exceed the number given in the table.

Also note that the available recording time is listed for a 64 GB **SxS PRO** card at 24 fps. A lower sensor frame rate will increase the available recording time, while a higher sensor frame rate will decrease it.

For a detailed table of available frame rates and possible codec/card combinations, please refer to the Chapter *FPS* on page 70.

DNxHD

Note: On ALEXAs with XR module, DNxHD recording is currently unavailable and will be available again in a later SUP version.

With the DNxHD license key installed, the ALEXA can record 1920 x 1080 (16:9) DNxHD encoded MXF files onto SxS PRO cards. MXF/DNxHD material can be edited in Avid Media Composer Version 5.5 and later without transcoding.

The Material eXchange Format (MFX) is a core media container technology for nonlinear workflows. An MXF container file can "wrap" different types of video and audio material along with associated metadata. The internal structure of MXF files is defined by the so-called Operational Patterns. ALEXA cameras record DNxHD encoded images together with sound and embedded metadata in an MXF container file using the Operational Pattern 1a (OP1a) file structure. An Avid Media Composer does not need to transcode this material, as it already is available in a native DNxHD codec. The OP1a MXF format packages picture, sound and metadata in a single file. This is ideal for both camera acquisition and archiving since audio and video is always kept together and no data is lost if recording is interrupted for any reason.

Format	Sensor Mode	Reso-lution	Color Coding	Data Rate @ 24 fps	Recording time on 64 GB SxS PRO @ 24 fps	Recording time on XR Capture Drive @ 24 fps
DNxHD 115/120/145	16:9	1920 x 1080	8 bit YCbCr	115 Mbit/s	72 min	255 min
DNxHD 175x/185x/220x	16:9	1920 x 1080	10 bit YCbCr	175 Mbit/s	48 min	170 min

DNxHD is a fixed bitrate codec. The codec naming convention indicates the codec's project frame rate:

- DNxHD 115 = 23.976/24 fps
- DNxHD 120 = 25 fps
- DNxHD 145 = 29.97 fps (30 fps is not available)
- DNxHD 175x = 23.976/24 fps
- DNxHD 185x = 25 fps
- DNxHD 220x = 29.97 fps (30 fps is not available)

For a detailed table of available frame rates and possible codec/card combinations, please refer to the Chapter *FPS* on page 70.

ARRIRAW

ARRIRAW data delivers unencrypted, uncompressed and uncompromised image quality from an ALEXA camera. It offers the highest achievable resolution, the camera's natural color response and great exposure latitude as uncompressed and unprocessed sensor data. ARRIRAW images have only one channel. A color reconstruction algorithm calculates the missing components of each pixel based on the type and position of the array of colored filters (Bayer pattern) on the camera sensor. As a result, half of the reconstructed image's green values are interpolated from the surrounding photosites rather than captured, as are three-quarters of the red and three-quarters of the blue.

ARRIRAW de-bayering is available through the ARRIRAW SDK or custom processing, which is implemented in most of the major post production tools for dailies processing and mastering.

The ALEXA sensor provides a horizontal resolution of 2.8K photo cells, from which downsampling routines produce optimized HD and 2K resolution images. For VFX, the images often are processed using the native sensor pixel count and then downscaled to 2K, for example, at a later stage. Using this approach takes advantage of the luminance resolution, which correlates to the sensor pixel count. Furthermore, it is possible to upsample ARRIRAW images to 4K. This works well because of ALEXA's excellent image quality.

Format	Reso-lution	Color Coding	File size	Data Rate @ 24 fps	Recording time on XR Capture Drive @ 24 fps
4:3 ARRIRAW 2.8K	2880 x 2160	12 bit Bayer	9.3 MB	1.79 Gbit/s	35 min
16:9 ARRIRAW 2.8K	2880 x 1620	12 bit Bayer	7 MB	1.34 Gbit/s	47 min

For a detailed table of available frame rates and possible codec/card combinations, please refer to the Chapter *FPS* on page 70.

Choosing a Recording Format

The selection of the recording format is a crucial decision which needs to be discussed with the production company and post production. While lower bit rate codecs offer longer recording times, they introduce compression artifacts that greatly limit the creative choices.

ProRes 422 (Proxy)	Use for video assist and proxy editing while the master is captured with an external device. Not suitable as camera master.
ProRes 422 (LT)	Use for video assist and proxy editing while the master is captured with an external device. Possibly suitable for internet video production.
ProRes 422	Use for basic television production. Limited options in color correction.
ProRes 422 (HQ)	Use for high quality TV production. Suitable for creative color correction.
ProRes 4444	Use for high quality TV and cinema production. Very suitable for creative color correction and visual effects work such as pulling mattes.
DNxHD 115/120/145	Use for basic television production. Very limited options in color correction due to 8 bit color depth.
DNxHD 175x/185x/220x	Use for high quality TV production. Suitable for creative color correction.
2.8K ARRIRAW	Use for cinema production, visual effects and high quality TV. Best format for creative color correction and visual effects work. Unencrypted and uncompressed format. Raw data needs to be processed into color images.

Whenever possible, test the full workflow pipeline with the preferred recording format before shooting.

Media preparation

The typical usage cycle of recording media is:

1. Format
2. Record
3. Copy
4. Back up
5. Verify data
6. Format

Format	Before recording, the drives/cards must be formatted. The camera always performs a blank format, which means that the media contain no metadata and are not assigned a reel number prior to recording the first clip. The camera auto-detects media with an invalid file system and asks the user to format the media. The ALEXA uses the UDF file system for ProRes/DNxHD recording and the Codex file system for ARRIRAW recording. Both file systems are read-only for computer systems, which minimizes the risk of data corruption.
Record	When the **REC** button is pressed, the camera starts to write a clip to the media. With the first clip, the camera also assigns a reel number. There is more information on file naming later in this chapter.
Copy	After recording is finished, the footage needs to be copied to another device in order to free up the media. The copy process should be verified using checksum calculation to ensure that no errors have occurred.

Backup	The footage should ideally be copied to two physically separate destinations. The first copy should be the "working copy", and the second copy should be the "backup copy". These tasks can be done in parallel, as long as the end result is verified data on two independent devices.
Format	Only when the data has been copied to two independent devices and verified, should the drive/card be formatted clear all data. We recommend that the person who verifies the primary and back-up copies should also format the media. The camera crew then always receives an empty card and does not need to worry if the footage has already been copied from the drive/card. SxS cards can be formatted with any file system, as it has to be reformatted by the camera anyway. XR Capture Drives can be formatted in the Codex software and do not require to be reformatted in the camera.

File Structure for ProRes/DNxHD Recording

After an **SxS** card or an XR Capture Drive is formatted in the camera, it is named ARRI UDF until the first clip is recorded. Once a clip has been recorded, the name changes to the camera index letter and reel number. Clips are stored in a folder with the same name as the media.

In addition to the clips, recording writes an XML file and an ALE file.

The XML file is a Final Cut Pro 7 (FCP) XML file. When opened in Final Cut Pro 7, all clips are imported as one bin. If the clips are copied from the card to another destination, the file paths in the XML file have to be adjusted to match the new file location. The XML file is not compatible to FCP X.

The ALE file is an Avid Log Exchange file for Media Composer. It contains all static clip metadata, which is also embedded in each recorded clip.

For more information about ALEXA metadata, please refer to the ALEXA Metadata Whitepaper, available at http://www.arri.com/camera/digital_cameras/downloads.

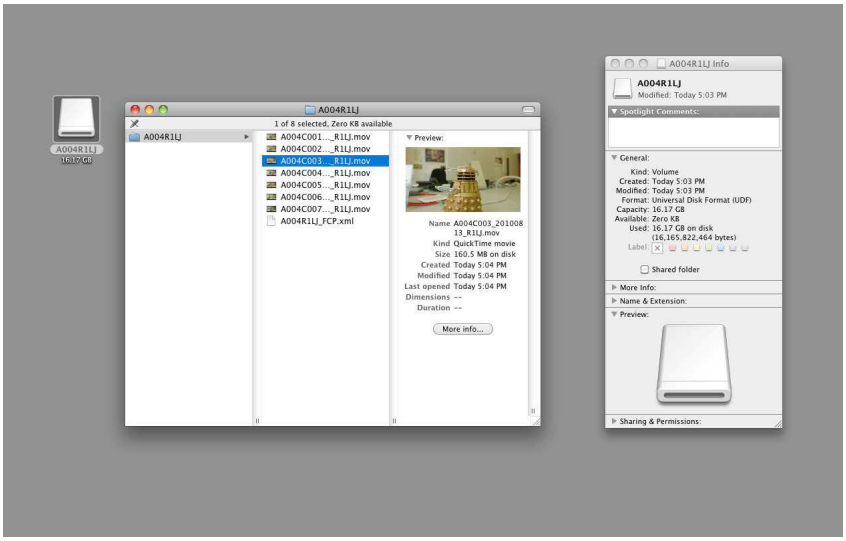


Figure 76: Example of ALEXA SxS card opened in Mac OS X

File Structure for ARRIRAW Recording (Codex VFS)

When an XR Capture Drive with ARRIRAW footage is loaded on a computer, it shows up like a regular external drive. Operating underneath, however, is the Codex Virtual File System (VFS). The VFS can present, for example, readily processed DPX files, MXF/DNxHD and/or QuickTime/ProRes proxies next to the original ARI files on the Codex volume. Except for the recorded data on the drive, none of these additional files actually exist. It's only when these files are requested, that they are generated, on-demand, and on the fly. Hence the term "virtual".

The file formats, file naming and directory structure that will be presented by the VFS are fully configurable through the Codex Platform software. This makes the VFS a highly flexible tool for providing exactly the material you require, when you want it, without redundant processing and storage overhead on your drives.

The default VFS configuration for the output of only ARRIRAW files uses the following file path:

<Extension>/<Roll>/<Shot>/<Shot>.<TC Frames>.<Extension>

For detailed instructions on the Virtual File System configuration, please visit http://www.codexdigital.com/support/media-stations and download the Codex VFS Guide.

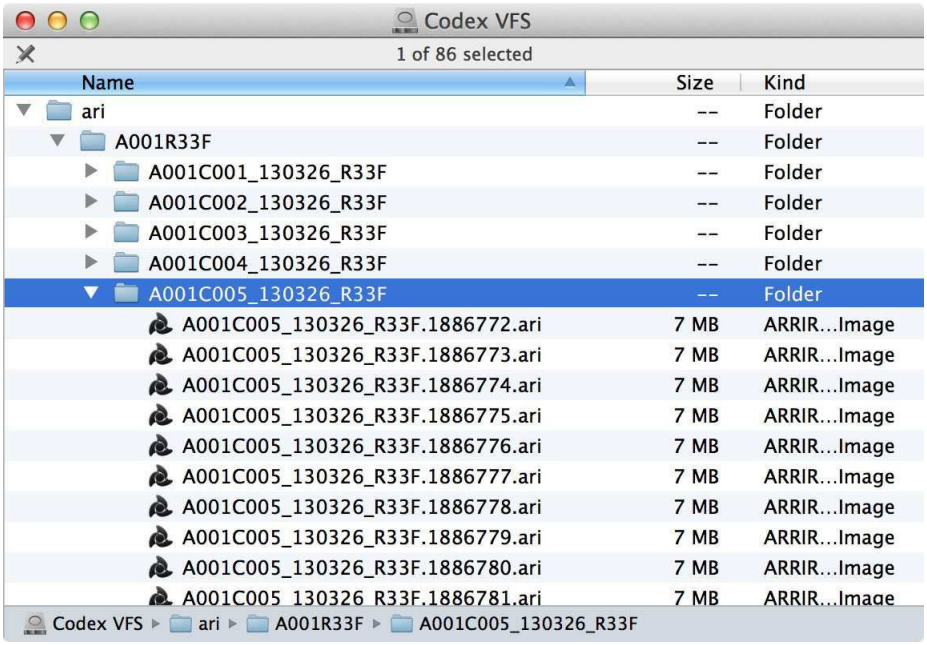


Figure 77: Example of an XR Capture Drive using the VFS default file structure in Mac OS X

File naming scheme

ALEXA automatically names files as they are created on the recording media. While it is possible to change the file names later on a computer, it is not recommended, as the ALEXA naming scheme has been developed to minimize the risk of duplicate file names.

The file name consists of 6 parts:

- Camera Index: One character, A-Z. User assignable, should match the camera unit. For example, the camera index A can be assigned to the A camera, and B to the B camera.
- Reel Counter: 3 characters, 001-999. Auto-assigned to each drive/card, automatically advanced by one for each new drive/card. The user can change the counter for the next reel. This should only be done under special circumstances, such as after changing the camera body in the middle of a shoot.
- Clip Index: One character, fixed to C. Main use is to separate the reel counter from the clip counter. If more than 999 clips are recorded to one card (not likely to happen), it changes to D.
- Date: Current date, in order YYYYMMDD, as set in Menu>System/Time/Date, separated from the other naming components by underscores.
- Camera ID: Consists of a one letter prefix, user-adjustable between R and L, and the camera serial number encoded in 3 letters Base36 (0-9, A-Z).

The file name for ARRIRAW files on XR Capture Drives is controlled by the VFS configuration. We highly recommend to use the standard file naming convention "<shot>.<TC frames since midnight>.<extension>", whereas "shot" automatically uses the ALEXA naming scheme described above.

The reel counter should be set to 001 at the beginning of a shoot. The camera will then automatically advance the reel number each time a new drive/card is loaded into the camera, formatted and recorded on. If a previously recorded drive/card is reloaded in the camera (comparable to a short end of a film roll), it will keep its reel number and the camera will continue the reel count. If the drive/card is loaded in another camera, the card keeps its name, but a new folder with the according camera ID and reel number is created in the root folder of the drive/card. It is possible, but usually not necessary, to manually change the next reel number in the Project menu.

Examples

A typical ProRes/Quicktime file name would look like this:

- A004C010_20130110_R1JL.mov

A typical DNxHD/MXF file name would look like this:

- A004C010_20130110_R1JL.mxf

A typical ARRIRAW file name would look like this:

- A004C010_20130110_R1JL.1886777.ari

The translation of this name is as follows:

- This clip was the tenth clip recorded on the fourth reel.
- This clip was recorded on January 10, 2013.
- The camera assigned the Base 36 serial number 1JL, which translates into the decimal serial number 2001 (For a Base 36-to-decimal converter, visit http://www.translatorscafe.com/cafe/units-converter/numbers/calculator/decimal-to-base-36/ or conduct an internet search.)
- Frame number 1886777 on a 24 fps project translates to a time of day time code of 9:50:15pm and 17 frames.

Additional recommendations

To minimize the risk of lost data, ARRI suggests the following guidelines for data management:

- Pre-format your media. Format all the drives/cards in the camera before shooting begins. This will save production time at least until all cards have been used once. The media do not receive a reel number until the first clip is recorded, so there is no need to use the cards in the same order they were pre-formatted. Formatting a 32 GB card normally takes less than 10 seconds.

- Limit the recording time, especially on the drives. Compressed recording offers very long recording times. Please consider limiting the recording time to 30 minutes of footage per card/drive to reduce risk of loosing data.
- Download and back up data immediately after reloading the camera to minimize the time that data exists in just one place.
- On **SxS** cards, use the write protect tab before sending it to the data wrangler.
- After an **SxS** card has been downloaded and backed up, disengage its write protect before formatting.

Metadata

Metadata is stored in the XML file, the ALE file, in the recorded frames/clips. The most important metadata for post production workflow is the tape name, as it will be one of the primary identifiers used in the EDL. The term tape name is an existing post-production naming convention that is also used for nonlinear media. The term reel name may also be used.

The tape name of ALEXA files is limited to 8 letters to match the CMX 3600 EDL standard. It consists of the Camera Index, reel counter and the Camera ID. Based on the previous example, the tape name of the clip would be A004R1JL.

Even if the user forgets to assign different camera indices to two cameras on the same project, the Camera ID metadata guarantees unique tape names.

The Quicktime file carries a single timecode track.

In DNxHD/MXF files, metadata is stored as an .ale file, and in an XML file embedded in the MXF.

For more information, please refer to the Metadata white paper available for download on the ARRI website.

Dual recording

The Dual recording function is only available on ALEXA Classic cameras with an **SxS** module. It allows recording to two **SxS PRO** cards in parallel, creating an instant backup at the time of recording. To enable dual recording, set Dual recording to On in the INTERNAL menu (in RECORDING menu).

Requirements for dual recording:

The **SxS PRO** cards must be of the same capacity.

- When reloading, or changing reels, both cards must be formatted.
- The **SxS PRO** cards must have identical file structure.

Follow the procedures for normal recording to a single **SxS PRO** card, but manage the **SxS** cards as a set. Download and back up one card and keep the other card as an additional backup.

12.1.2 External recording

In addition to internal recording, the ALEXA can also output uncompressed HD and unprocessed ARRIRAW* data to external recorders over the REC OUT.

Choose the preferred output format based on the following basic guidelines:

- 422 1.5G: use for television applications that require only color correction and high-speed capture above 30 fps.
- 444 1.5G: Use for high-quality television applications that require color correction and visual effects work such as pulling mattes, and for cinema applications.
- ARRIRAW*: Use for high-quality cinema applications destined for multi-format distribution.

422 1.5G YCbCr

422 is a format in which color is sub-sampled, meaning that the camera-native RGB image is transformed to a YCbCr color space. Y represents luminance, while Cb and Cr are color difference signals. Cb and Cr are sampled with only half the horizontal resolution, as the human eye is less sensitive to color resolution than to luminance resolution. 422 is a good balance of lower bandwidth in transmission and high quality visual results.

For frame rates up to 30 fps, 422 1.5G is transmitted over a single HD-SDI cable. REC OUT 1 and REC OUT 2 carry the identical signal independently. When shooting frame rates higher than 30 fps, the signal is split across both REC OUT 1 and REC OUT 2 and requires connecting two HD-SDI cables.

422 3G YCbCr

3G is an improved HD-SDI format that can transmit signals over a single cable which previously required two cables. It transports the same signal as 422 1.5G YCbCr dual link, but over one cable with a higher clock rate. REC OUT 1 and REC OUT 2 carry the identical signal independently.

444 1.5G RGB

444 is still in the RGB color space, with each color at its full resolution. This is important when chroma keying, as these composites rely on color resolution.

444 1.5G is transmitted over two HD-SDI cables, with each cable carrying part of the image data. It is important to

- connect REC OUT 1 on the camera with record input 1 (or A) on the external recorder and REC OUT 2 on the camera with record input 2 (or B) on the external recorder
- use matched lengths of HD-SDI cables for links 1 and 2

444 3G RGB

There are two types of 444 3G signal.

- The single link version contains the same signal as the 444 1.5G signal, but according to SMPTE 425M over a single cable.
- The dual link version uses a proprietary image mapping for frame rates from 30 to 60 fps, and is only currently supported by certain recorders.

ARRIRAW* 1.5G DL

ARRIRAW is the proprietary raw data generated by ARRI cameras. Raw data is the sensor image data before it is converted to RGB images. The ALEXA has a single sensor with a Bayer pattern color filter array, meaning that every pixel has only one channel of color information.

With normal HD images, the missing color channel information is calculated from the adjacent pixels in the camera.

With raw data, this calculation is delayed until after the recording to save bandwidth and creative options. Shooting ARRIRAW allows many decisions on how to convert the images to be made in post-production.

ALEXA ARRIRAW specs:

- Bayer pattern color coding
- 12 bit log luminance coding
- No white balance applied
- No exposure index applied
- Full sensor resolution (2880x1620)

ARRIRAW is transmitted to the recorder via ARRIRAW T-Link using standard HD-SDI dual link cables with proprietary encoding. The HD-SDI signal complies with the SMPTE 372M standard.

An ARRIRAW T-Link-certified recorder must be used for recording ARRIRAW. Certified recorders are available from Codex, Convergent Design and S.Two, among others.

For more information, visit http://www.arri.com/alexa/arriraw.

ARRIRAW* 3G SL

The ARRIRAW 3G SL signal format uses a single HD-SDI signal that complies with the SMPTE 425M standard. It is similar to ARRIRAW 1.5G DL, but uses only one cable.

ARRIRAW* 3G DL

This output format is fully proprietary and does not follow SMPTE standards. It is used to transmit ARRIRAW with frame rates between 30 and 60 fps.

---

*ARRIRAW T-Link output is not supported on ALEXA HD, ALEXA HD Plus and ALEXAs with XR module.

Note: Only use double-shielded HD-SDI cables on all HD-SDI outputs to ensure error-free data transmission!

Triggering record on an external recorder

When internal recording is set to *Off,* the **REC** button triggers only the SDI record flag, signaling the recorder to start and stop recording.

The SDI record flag is an ancillary data packet in the blanking area of the HD-SDI signal that contains information about active recording. This packet is always embedded in the HD-SDI signal.

Note: With the SDI record flag, successful recording cannot be guaranteed, as there is no feedback from the recorder to the camera.

12.1.3 Parallel recording

Recording both internally and to external recorders simultaneously offers additional workflow options. For example, the internal recording can be used for dailies and proxy editing, while the external recorder captures the master data. On ALEXA XTs or ALEXA Classic cameras with an XR Module, the XR Capture Drive can capture the ARRIRAW camera master while the REC OUT can be used to feed a video assist.

Remote controlling the external recorder

Whenever the camera switches between record and standby mode, it triggers the SDI record flag on the REC OUT connectors, signaling an attached recorder to start or stop recording. The SDI record flag is an ancillary data packet in the blanking area of the HD-SDI signal that contains information about active recording.

Note: There is no feedback channel providing information to the camera if the

external recording is active. Check the external recorder directly to determine whether or not recording is active.

Timecode on external recorders

To keep timecode locked across internal recording and the external recorder when recording in parallel, configure the external recorder so that it uses the TC embedded in the HD-SDI stream from the camera.

12.1.4 High Speed recording

When a valid High Speed license key is installed, frame rates of 60 to 120 fps are enabled in 16:9 High Speed mode, and from 48 to 90 fps in 4:3 High Speed mode. All recording codecs except ProRes 4444 are available in 16:9 High Speed mode. 4:3 High Speed mode is only available on ALEXAs with XR module and in ARRIRAW recording mode.

For a detailed table of available frame rates and possible codec/card combinations, please refer to the Chapter *FPS* on page 70.

The REC OUT output carries the same signal as the MON OUT during High Speed mode (called 'MON OUT clone').

Note: Camera boot-time is increased by approximately 40 seconds when High Speed mode is active during a power-cycle.

12.2 Monitoring

The ALEXA's monitoring options are the electronic viewfinder EVF-1 and the MON OUT. Surround view is available on both. With surround view set to On, 10% additional pixels outside the recorded image area on the ALEXA's ALEV III sensor are displayed, allowing the operator to see outside the recorded image and keep unwanted objects, such as microphone booms, out of the shot. To view only the recorded image, set Surround view to off.

To aid in framing, both the EVF-1 and MON OUT can display frame lines overlaid on the image. Frame lines can be considered electronic versions of ground glasses in film cameras.

12.2.1 Frame Lines

Frame lines are stored as XML files. A standard set of frame lines is provided in each camera, including:

- 1.33:1
- 1.66:1

- 1.78:1
- 1.85:1
- 2.39:1
- 2.39:1 1.3x anamorphic
- 2.39:1 2.0x anamorphic

Note: When shooting ProRes 2K (2048x1152) for a DCI 2K release in a 1.85:1 aspect ratio, the preloaded frame line ARRI 1.85 2K DCI can be used to mark the corresponding 1998x1080 area for a DCI 2K 1.85 without requiring any scaling in post production. This frame line is not available in HD mode (1920x1080).

The user can also create custom frame lines to match production specifications.

Description of the frame lines XML file

The different sections in the file are:

- camera: describes the ALEXA model that the frame lines file is made for.
- line: frame lines and the center cross in the active image area consist of single lines. The line orientation is defined by three attributes: left, right, bottom and top for horizontal lines, top, bottom, left and right for vertical lines. Two attributes define the start and end points, and the third attribute defines the distance from the image edge.
- Distances for start, end and position are relative to the width or the height of the image and have a precision of 5.
- To create a centered frame line with a center cross as in the example, a total of six lines is necessary.
- To calculate the position of a line for a given aspect ratio, use the following formulas:
  - horizontal lines for aspect ratios >1.78 (e.g. 1.85): [1-(1.78/Aspect)]/2=distance from bottom or top
  - vertical lines for aspect ratios <1.78 (e.g. 1.33): [1-(Aspect/1.78)]/2=distance from left or right

XML example

The following sample XML code illustrates the frame lines system . It describes frame lines for a 2.35 centered aspect ratio inside the camera's 1.78 recorded image.

```
<?xml version="1.0" encoding="UTF-8"?>
<!-- NOTES:
       All widths are in pixels.
       All colors can be one of: black, white, or user.
       If you select user, the color can be changed through
       the user interface.
       You can add as many lines as you like. Lines are
       defined by giving 3 distances from the border.
       So if you specify top, left and right it will
       be a horizontal line with the given distance
       from left, right and from the top.
       The values are in the range [0, 1], where:
               0 is at the edge
               1 is on the opposite edge
       So specifing 0.4 from left is the same as 0.6 from right.
-->
<framelines>
       <!-- The description of the camera, this will
            only be used for selecting the correct files.
            So the user can only select glasses for his
           camera/current setup. -->
       <camera>
               <type>Alexa EV</type>
               <sensor>3K</sensor>
               <aspect>1.78</aspect>
               <hres>2880</hres>
               <vres>1620</vres>
       </camera>

       <!--user color line at top and bottom of 2.35 aspect-->
       <line>
               <left>0</left>
               <top>0.12174</top>
               <right>0</right>
               <width>4</width>
               <color>user</color>
       </line>
       <line>
               <left>0</left>
               <bottom>0.12174</bottom>
               <right>0</right>
               <width>4</width>
               <color>user</color>
       </line>

       <!-- Center cross horizontal lines, user color -->
       <line>
               <left>0.46355</left>
               <top>0.5</top>
               <right>0.50868</right>
               <width>4</width>
               <color>user</color>
       </line>
       <line>
               <left>0.50868</left>
               <top>0.5</top>
               <right>0.46335</right>
               <width>4</width>
               <color>user</color>
       </line>
       <!-- Center cross vertical lines, user color -->
       <line>
               <left>0.5</left>
               <top>0.43519</top>
               <bottom>0.51543</bottom>
```

```
                <width>4</width>
                <color>user</color>
        </line>
        <line>
                <left>0.5</left>
                <top>0.51543</top>
                <bottom>0.43519</bottom>
                <width>4</width>
                <color>user</color>
        </line>
</framelines>
```

12.2.2 Status Info Overlays

The ALEXA can display camera status information on both the MON OUT and EVF-1.

At the top and bottom of the screen, the ALEXA displays textual status information. The top status bar consists of sensor FPS, shutter angle, exposure index and white balance. In the EVF-1, the status bar also works as a menu, allowing the user to change the values when the **CAM** button is pressed.

The bottom status bar displays information about the battery levels, recording/standby flag and remaining capacity of internal storage.

On the left and right of the screen, icons provide information about the current status of the camera. The icons are organized into groups.

The left icon group is labeled SYS and contains information about the general system state of the ALEXA. On the right side, there are three groups labeled MON, EVF and LOOK. They provide specific information about the MON OUT, EVF-1 and the application of ARRI Look Files.

The following table explains the icons in the SYS group:

Icon	Description
	Indicates that the current recording resolution is set to HD.
	Indicates that the current recording resolution is set to 2K.
	Indicates that the current recording mode is set to RAW.
	Indicates that there is a warning condition in the camera.
	Warns that the camera has detected an error.
	Indicates that the camera temperature is outside of its optimal range.

Warns that the camera temperature has reached a critical point where it can no longer be operated and must be powered down.

Indicates that audio recording has been switched on.*

Warns that audio recording has been switched on, but is currently disabled, e.g. because of an off-speed framerate.*

Indicates that the camera controls are locked.

Only shown in EVF-1

Indicates that the motorized sliding ND filter is in the optical path*

Only for ALEXA Studio models

Indicates that a frame grab is currently in progress.

Indicates that the signal from the RET IN connector is currently displayed.

* Valid for SUP 8.1 (ALEXA XT/XR) but not SUP 8.0 (ALEXA Classic)

The following table explains the icons in the MON, EVF and LOOK group on the right:

Indicates that the gamma of the respective output is set to REC 709.

Indicates that the gamma of the respective output is set to LOG C.

Warns that peaking is active on the respective output.

As peaking may alter the image in subtle ways not easily noticed otherwise, this icon is colored orange.

Warns that smooth mode is active in the EVF-1.

As smooth mode alters the image reproduction in the EVF-1, this icon is colored orange.

Indicates that the CDL server connection has been enabled and established.

Shown in orange when CDL server connection has been enabled but not established.

EVF	Indicates that the current Look File is applied to the EVF-1.
MON	Indicates that the current Look File is applied to the MON OUT output.
INT	Indicates that the current Look File is applied to the internal recording path.
REC	Indicates that the current Look File is applied to the REC OUT output.

12.3 Using Timecode

Timecode ensures that every image of recorded media can be identified with a unique value and synced with corresponding media, such as sound or the second camera in a 3D application. When used with other metadata, such as reel names, all recorded media maintains its unique identity.

Following are two ways timecode can be used on a production:

External TC, Time of day

- *Use:* This format is often used on multi-camera productions with sync-sound. When all cameras are running at sync-sound speed, which is also the project frame rate, sound and image time code match and allow for easy syncing in post.

- *Setup:* The sound department acts as the timecode master, and generates timecode which uses the time of day as a value, and a time base matching the project frame rate. Twenty-four hours of time will translate into twenty-four hours of time code. Timecode is fed to the camera via the TC connector. The timecode source must be set in the camera to Ext LTC and the mode to Free Run. The project fps setting must match both the sensor frame rate and the time base of the external timecode signal. The camera can be set to use Jam sync generator, in which it samples the timecode value once and then continues counting based on its own high-precision crystal clock. The timecode source can be disconnected from the camera after jamming in Jam sync generator mode. This mode ensures stable timecode with an offset of less than one frame for each eight hours, after which the camera has to be re-jammed. Alternatively, the camera can be set to regenerate mode, or Regen on the TIMECODE OPTIONS screen. In Regen mode, the camera uses the timecode value of the external timecode source. This ensures correct timecode for an infinite duration, but the timecode source must remain connected to the camera. Note that the camera ignores external timecode during record and counts using its internal clock to avoid timecode jumps should connection problems arise, e. g. due to a faulty timecode cable.
- *Variations:* If shooting starts close to midnight, the timecode might be started with an offset time of day to prevent a rollover at midnight.
- *Restrictions:* External timecode is only possible if the camera is running at sync-sound speed. If the camera is over- or under-cranking, the timecode frame rate will no longer match the sensor framerate, and timecode values would either be duplicate or dropped. To prevent this, the ALEXA will automatically switch to Int TC source and Regen mode when the sensor frame rate is changed.

Internal TC, Rec Run

- *Use:* Record run timecode is often used on single camera productions that are either MOS or use a dumb slate to sync picture and sound. Record run timecode guarantees continuous timecode on all recorded data. Record runtime code also works with over- and under-cranking.
- *Setup:* The timecode source must be set to Int TC, the mode to Rec Run and the generator to Regen. Timecode counts up only during recording, by one frame for each image generated by the sensor. The timecode counts at the project frame rate set on the camera. Normally, the timecode hour value advances by one hour for each new reel, using only hours 01-20 for reel 1-20, and then restarting at hour 01 for reel 21.
- *Variations:* Record run timecode might be used for off-speed work on productions that use external timecode sources for all sync sound

- *Restrictions:* None.

12.4 Syncing the Sensors of Two Cameras

Two ALEXAs can be synced for 3D applications or any application requiring sensor sync using the EXT connectors and corresponding cable. When synced, images are captured from each camera's sensor at precisely the same time. Sensor syncing is not available on ALEXA HD and ALEXA HD Plus models.

Note: Syncing two sensors is possible at frame rates between 1.000 and 60.000 fps.

To sync the sensors of two ALEXAS:

1. Connect an EXT cable KC 155-S to the EXT ports on each ALEXA.
2. In the System menu on the master camera, select External Sync.
3. On the EXT SYNC screen, set Sensor sync to EXT master.
4. In the System menu on the slave camera, select External Sync.
5. On the EXT SYNC screen, set Sensor sync to EXT slave. It takes approximately five seconds for the two ALEXAs to sync.

The master camera triggers the slave camera so that images are created at the same moment of time with an accuracy of 10 µs. Whenever an error occurs, the camera will issue a warning.

Image integration between master and slave camera has a locked offset of less than 10 µs. This means that in the worst case, exposure differs by 4.3% (@ 60 fps frame rate and 5.0° shutter angle). With a regular exposure time (24 fps, 172.8°), the maximum difference is 0.05%.

Synchronizing Image Output

The REC OUTs and MON OUTs of two ALEXAs can also be synchronized. To achieve this, the user must send a trigger from the master camera to the slave camera after sensor sync is established.

To sync the REC OUTs and MON OUTs of two ALEXAs:

1. Ensure that the sensors of the two ALEXAs are synced.
2. In the System menu on the master camera, select External Sync.
3. On the EXT SYNC screen, select Send HD sync trigger.
4. Press the jogwheel to send the trigger to the slave camera. The camera will display the message *HD sync trigger sent to slave camera!*. If the sensors are not synced, the camera will display the error message *Trigger not sent. Camera must be set to Ext sync: Master!*.

After the sync trigger has been sent, the slave camera will no longer display the warning *HD outs not synced. Trigger now!*.

If the two cameras' settings are synced over Ethernet, the trigger is automatically sent.

When the outputs are synced, jitter between the two cameras' HD outputs is less than 500 ns. The HD output of each camera can be advanced or delayed by up to 30 HD clocks (1 HD clock= 13.46 ns), allowing for a total shift of 60 HD clocks (808 ns total) between cameras.

Timecode

Timecode is also transmitted from the master to the slave over the EXT cable. When a camera has been set to slave, it automatically uses the timecode values transmitted over the EXT cable. The TC screen will display *EXT TC from master camera* as TC source, and all options are disabled. Only the master camera outputs LTC timecode on its TC connector.

Note: When the mirror shutter is switched on, an ALEXA Studio can only be synced to another ALEXA Studio.

12.5 Syncing the Settings of Two Cameras

Two ALEXAs can be operated with synchronized settings. ARRI recommends to sync the settings ALEXAs of the same model only, for example, two ALEXA Plus models. Settings syncing is not available on ALEXA HD and ALEXA HD Plus models.

Camera connection

The settings of two ALEXAs can be synchronized over ethernet using the ALEXA Ethernet/Ethernet Cable KC 156-S, or over an ethernet hub using the ALEXA Ethernet/RJ-45 Cable KC 153-S.

Camera setup

To sync the settings of two ALEXAs over Ethernet:

1. Connect an ALEXA Ethernet/Ethernet Cable KC 156-S to the EXT ports on both ALEXAs, or an ALEXA Ethernet/RJ-45 Cable KC 153-S to the ethernet hub and the EXT port of each ALEXA.
2. In the System menu on the master camera, select External Sync.
3. On the EXT SYNC screen, set Settings sync to ETH master.
4. In the System menu on the slave camera, select External Sync.
5. On the EXT SYNC screen, set Settings sync to ETH slave. The two ALEXAs will automatically negotiate IP addresses. It takes approximately five seconds to establish a connection.

The master camera will initially distribute its settings to the slave camera. Once this is done, settings can also be changed on the slave camera, and the change will take effect on both cameras. This is useful if the master camera's controls are not accessible.

If a camera is set to ETH master or ETH slave, but is not connected to another camera, a warning is displayed on the STATUS Info screen.

Synced settings

The following settings are synced when syncing two ALEXAs:

WB>White Balance + CC Tint

EI>Exposure Index

FPS>Sensor FPS

FPS>HIGH SPEED>High Speed mode[2]

SHUTTER>Shutter Angle

COLOR>Gamma>SxS

COLOR>Gamma>REC OUT

COLOR>Gamma>MON OUT

COLOR>Gamma>REC OUT

COLOR>Gamma>EVF

COLOR>Gamma>LOG C film matrix

MENU>Recording>Internal>Mode

MENU>Recording>Internal>Codec

MENU>Recording>Internal>High Speed codec[2]

MENU>Recording>REC OUT>Frame rate

MENU>Recording>REC OUT>HD-SDI format

MENU>Recording>REC OUT>Scan format

MENU>Recording>REC OUT>Output range

MENU>Recording>REC OUT>REC OUT fps sets sensor fps

MENU>Recording>REC OUT>SDI remote

MENU>Recording>REC OUT>Vari flag

MENU>Monitoring>EVF>Status info

MENU>Monitoring>EVF>Surround view

MENU>Monitoring>EVF>Surround mask

MENU>Monitoring>EVF>Framelines

MENU>Monitoring>EVF>Anamorphic desqueeze[1]

MENU>Monitoring>MON OUT>Frame rate

MENU>Monitoring>MON OUT>Scan format

MENU>Monitoring>MON OUT>Status info

MENU>Monitoring>MON OUT>Surround view

MENU>Monitoring>MON OUT>Surround mask

MENU>Monitoring>MON OUT>Framelines

MENU>Monitoring>MON OUT>Anamorphic desqueeze[1]

MENU>Project>Project fps

In addition, the slave camera takes over the Camera ID of the master camera, so file names are identical except for the Camera ID prefix. It is important to give the master and the slave camera different Camera ID prefixes to prevent duplicate file names.

[1]Valid license for anamorphic desqueeze must be installed on both cameras.

[2]Valid license for High Speed recording must be installed on both cameras

12.6 Sensor modes 16:9 and 4:3

The ALEXA M, ALEXA Plus 4:3, ALEXA Studio and all ALEXA XT models have ALEV III sensors and can be operated in 16:9 or 4:3 mode.

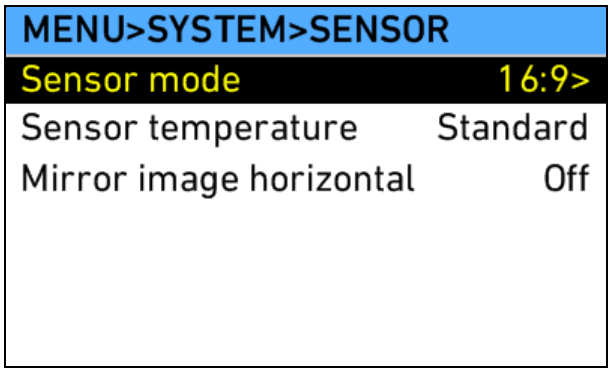
In 4:3 mode, the camera captures images from a vertically extended sensor area. The used area is 23.76 x 17.82mm in size, which translates to 2880 x 2160 sensor photo sites.

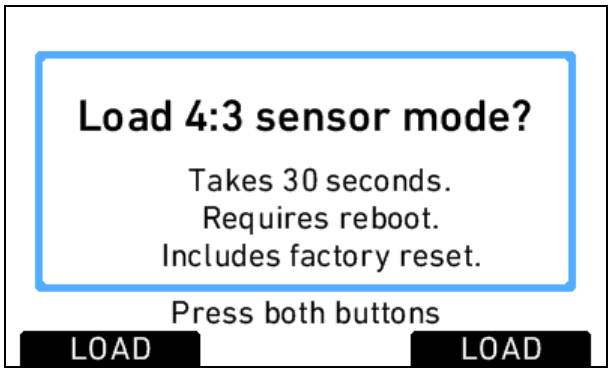
Note: The sensors of standard ALEXA and ALEXA Plus cameras can only be operated in 16:9 mode.

To change the sensor mode:

1. In the System menu, select Sensor.
2. Select Sensor mode. The current sensor mode is indicated on the top line on the SENSOR screen.
3. Press the jogwheel to select 16:9 or 4:3 sensor mode.

4. Press the **LOAD** buttons simultaneously to load the new sensor mode.
   Loading the new sensor mode takes approximately 30 seconds including a mandatory camera reboot. A progress bar indicates the sensor mode loading progress.





Note: Switching from 16:9 to 4:3 and vice versa always includes a factory reset.

Frame rate

The maximum sensor frame rate in 4:3 is 48 fps.

4:3 and Highspeed Mode

It is possible to switch from 4:3 to High Speed mode and vice versa. If recording is set to ProRes, only the 16:9 center area of the image sensor is read out. If recording is set to ARRIRAW (only available for ALEXAs with XR module), 4:3 High Speed is available.

Recording

Internal recording is only possible with ProRes codecs in 2K (2048x1536) resolution, and ARRIRAW on ALEXAs with XR module.

External recording is only possible in ARRIRAW on ALEXAs with SxS module (except ALEXA HD and ALEXA HD Plus) and with recorders that support ARRIRAW 4:3.

Monitoring

For monitoring, the 4:3 image is downscaled to 960 x 720 pixels for the EVF and 1440 x 1080 for the MON OUT. Only horizontal surround view is available in 4:3 mode. The image is not rescaled for surround view, but horizontally extended. The non-active area of the EVF and MON OUT is filled with black ("pillarboxed").

Anamorphic desqueeze

Both 1.3x and 2x anamorphic desqueeze is available in 4:3 mode. 1.3x anamorphic desqueeze results in an image size of 1280 x 720 for the EVF and 1920 x 1080 for the MON OUT, while 2x desqueeze results in an image size of 1280 x 480 for the EVF and 1920 x 720 for the MON OUT.

For the optical viewfinder, anamorphic desqueeze can be achieved by flipping an anamorphic element into the optical path. By default, the OVF has an optical element for 2x desqueeze. Elements for 1.3x desqueeze are also available.

13 ALEXA Plus

The ALEXA Plus has a unique side cover that contains extended electronics and offers the following additional functions over the standard ALEXA:

- Built-in radio system for wireless remote control of lens and camera
- A level sensor to determine the camera's tilt and roll in degrees
- Three CLM (Controlled Lens Motors) ports for driving CLM-2, CLM-3 or CLM-4 motors
- Two LCS (Lens Control System) bus interfaces for connecting WCU-3, WHA-3 and ZMU-3 hand units
- LDS Lens Data System for reading lens data from LDS lenses
- Depth of field calculation for LDS lenses and LDA (Lens Data Archive) lenses in combination with calibrated lens motors
- LDD (Lens Data Display) interface
- Lens Adapter PL Mount LA-PL-2 with LDS support
- Control of LDS, radio, and lens motors through the camera user interface
- A third RS socket
- A second MON OUT output
- An additional function button labeled **WRS** (Wireless Remote System). It gives access to the WRS screen, from where all camera settings related to the Plus camera features can be adjusted.

Any ALEXA can be upgraded to an ALEXA Plus by installing the Plus module.

Note: The Plus module must be installed by an authorized ARRI service center only.

Figure 78: CLM sockets

Figure 79: ALEXA Plus connectors

13.1 Lens Adapter PL-Mount LA-PL-2 (with LDS)

The ALEXA Plus lens mount supports the ARRI Lens Data System. An LDS lens must be mounted in the 12 o'clock or 3 o'clock position to enable the LDS functions. Take care not to damage the LDS contacts on the lens and the camera when mounting or unmounting a lens or lens port cover.

Apart from the LDS feature, the same procedures as with the *LA-PL-1* (on page 60) apply.

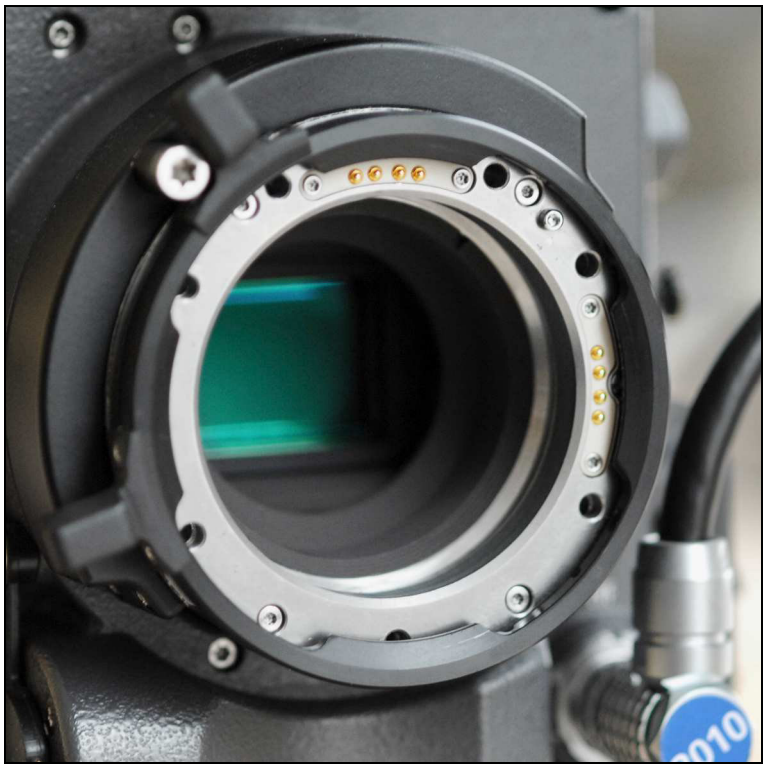


Figure 80: Lens adapter PL-Mount LA-PL-2 (with LDS)

13.2 Radio System

The ALEXA Plus module contains a radio unit that enables wireless lens control, lens data communication and remote control of basic camera functions. The radio system is called white radio and it can be identified by a white ring at the base of the antenna mount point. It offers 8 channels to choose from:

Channel	Frequency
0	2.410 GHZ
1	2.415 GHZ
2	2.430 GHZ
3	2.435 GHZ
4	2.450 GHZ
5	2.455 GHZ
6	2.470 GHZ
7	2.475 GHZ

White radio and legacy yellow radio cannot be mixed in the same radio network of camera and hand units. It is possible to use both systems in parallel within different radio networks.

Up to three hand units can be connected to one camera in parallel to form a radio network.

Note: When a camera is set to "Sensor sync: EXT slave", its radio module automatically switches itself off, and the camera receives CLM control commands from the Master camera via the EXT cable.

13.3 Wireless Remote System

13.3.1 Lens Motors

The ALEXA Plus supports ARRI CLM-2, CLM-3 and CLM-4 motors. CLM-1 motors are not supported. CLM-2, CLM-3 and CLM-4 motors can be used in a mixed setup.

Note: Use only one lens motor per lens axis.

Lens motors should be connected, according to their position on the lens, to the IRIS, FOCUS and ZOOM sockets on the camera-right side.

Motor calibration

After connecting a lens motor to the camera and the lens, it must be calibrated. The lens motor must be recalibrated under the following conditions:

- when the lens motor is detached from the lens

- after a camera reboot
- after changing lenses
- after a change in motor position while powered down

Note: Omitting motor calibration might lead to damage of the lens due to the high level of motor torque.

Motor direction

The direction of the motors can be set in the ALEXA's menus.

To set the direction of a motor:

1. Press the **WRS** button.
2. Select the lens by pressing the **IRIS CLM**, **ZOOM CLM** or **FOCUS CLM** button.
3. Press the **LEFT** or **RIGHT** button to set the direction of the lens motor.

Motor torque

For CLM-3 and CLM-4 motors, the motor torque can be set in the ALEXA's menus.

To set the torque on a CLM-3 or CLM-4 lens motor:

1. Press the **WRS** button.
2. Select the lens by pressing the **IRIS CLM**, **ZOOM CLM** or **FOCUS CLM** button.
3. Press the **+1** or **-1** buttons to increase or decrease the motor's torque. Available torque settings are 1 to 4, with 1 being the lowest torque level.

Note: Ensure that the motor torque level matches the lens to avoid lens damage.

3D lens sync

When two ALEXA Plus cameras are set to Sensor sync EXT master and EXT slave, the slave camera will switch off its radio module and receive motor control commands from the master camera over the EXT connection.

Note: Matching of the master and slave cameras' lenses in terms of focus, iris and zoom ring positions depends on the mechanical accuracy of the lenses. Make sure the lenses in use are matched as closely as possible.

13.3.2 Hand Units

For detailed information of the hand units, please refer to the device's own manuals.

Wireless Compact Unit WCU-4

The WCU-4 is an all-inclusive and yet affordable hand unit offering up to 3-axis lens control. It includes a newly designed, super-smooth focus knob with adjustable friction and backlit, optionally pre-marked focus rings that are well readable in the dark without distracting performers. The whole unit is completely splash proof for ARRI-typical reliability. The slider has its scale on the 3” display, providing clearly readable T-stop numbers and optional on-screen markings. If preferred, the slider can be also set to show zoom scales.

Wireless Compact Unit WCU-3

The WCU-3 is a compact hand unit featuring a radio system to connect to the camera wirelessly. It has two LCS ports for connecting the device to the camera via cable and to attach a ZMU-3. A wheel and a slider can be used to control focus and iris axes. Zoom axis can be controlled by attaching a ZMU-3 at an LCS port.

The WCU-3 also has a display where it shows current fps, shutter angle, exposure index and white balance of the camera.

Wireless Main Unit WMU-3

The WMU-3 is a radio system for wireless connection to the camera. Both WFU-3 and WZU-3 can be attached to the WMU-3.

Wireless Focus Unit WFU-3

The WFU-3 has a knob and a slider that can be used to control focus and iris axes. It connects to the camera through a WMU-3 or a WHA-3.

Wireless Zoom Unit WZU-3

The WZU-3 controls the zoom axis. It connects to the camera through a WMU-3 or a WHA-3.

Wired Hand Adapter WHA-3

The WHA-3 allows both WFU-3 and WZU-3 to connect to the camera via cable.

Zoom Main Unit ZMU-3

The ZMU-3 controls the the zoom axis. It can be connected to the camera via cable to an LCS port, or via cable through an LCS port of an WCU-3, or wirelessly by using a WZE-3.

Wireless Zoom Extension WZE-3

The WZE-3 is a radio system that enables direct wireless connection of a ZMU-3 and a camera.

Hand Unit Priorization

Different priority levels are assigned to the hand unit devices to ensure only one device has control over a motor at a time.

A device's knob that is assigned to an axis has a higher priority than a device's slider assigned to the same axis. When steering items of the same type are assigned to the same axis, the one connected via WRS has highest priority, second highest priority has a device cable on the upper LCS port, the lower LCS port has the lowest priority. Of two radio devices with the same steering items assigned to the same axis, the one that connects to the camera first gains control.

Cabled devices can gain control of an axis at the time of connection. Wireless devices must be rebooted if an axis has become idle before they can gain control.

An exception to the rule are devices on the zoom axis. Here the cabled devices have the highest priority, with LCS port 1 having priority over LCS port 2.

13.4 Lens Data Display LDD-FP

The Lens Data Display for Focus Pullers LDD-FP can be used to display lens information. Connect it to the LDD port of the Plus module.

13.5 Plus Camera Controls

The ALEXA PLUS has an additional function button labeled WRS. It gives access to the WRS screen, from where all camera settings related to the Plus camera features can be handled.

The WRS screen gives an overview of radio status, camera level, LDS status, and CLM status. The screen buttons lead to screens containing more detailed info on these topics and where settings can be changed.

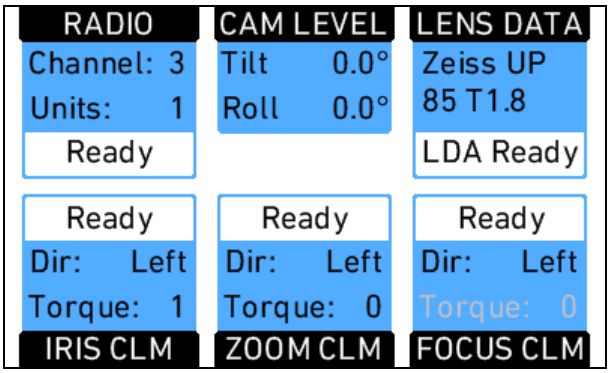


Figure 81: WRS screen

RADIO

Shows the currently set radio channel, the number of connected hand units and the staus of the radio system. Pressing the screen button opens a screen where radio can be set on or off and the channel number can be set. When radio is switched on, a small icon appears in the camera homescreen.

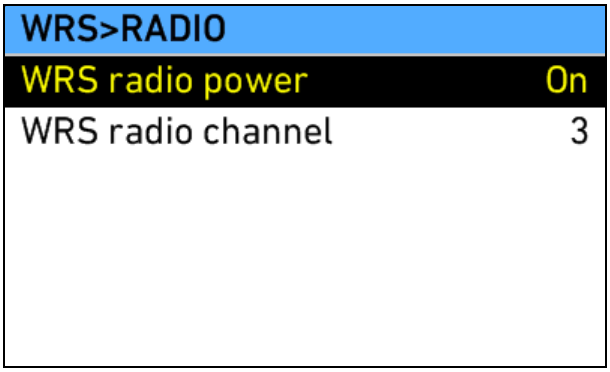


Figure 82: WRS radio screen

CAM LEVEL

Shows the tilt and roll of the camera in degrees as measured by the camera's position sensor. This sensor can be reset if it appears to have an offset. Press the CAM LEVEL screen button to access the reset screen. By pressing the two lower outer screen buttons simultaneously, the sensor is reset.

Note: The sensor can only be reset while both axis are within a threshold of +/- 10 degrees around 0.

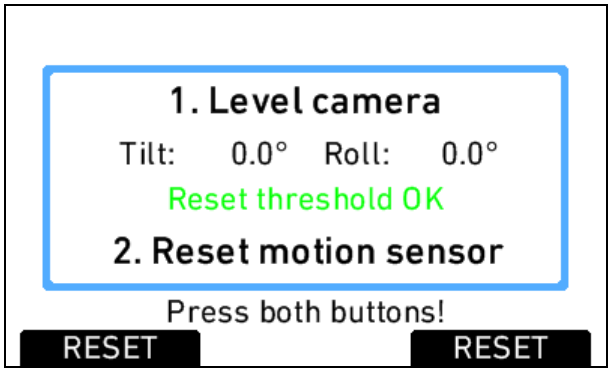


Figure 83: Motion sensor reset screen

LENS DATA

Shows the type of LDS lens connected and the LDS status. The LENS DATA screen button leads to the LDS screen, where lens info like lens type, current focal length, iris, focus distance and close and far point of depth of field are shown.

The OPTIONS screen button opens the LDS options screen, where the LDS unit can be switched between imperial and metric, and the circle of confusion for correct calculation of depth of field can be set.

Note: After connecting a new LDS lens, turn all lens rings slowly until all lens axes have transmitted their current positions.

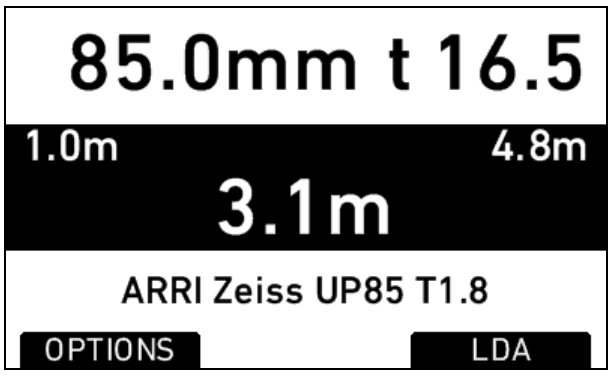


Figure 84: LDS info screen

LDA

When a non-LDS lens is connected, the user can achieve LDS functionality by using the Lens Data Archive. In the LDS screen, a button labelled LDA appears when a non-LDS lens is connected.

The LDA screen consists of a user list and a main archive list. The user list should only contain the lenses currently used to achieve quick access to the desired lens tables. The main archive contains a set of lens tables for ARRI/Zeiss Highspeed, Master Primes and Ultra Primes and can be extended with additional lens tables for any PL-Mount lens.

Note: Custom lens tables may have to be created manually beforehand.

Pressing the LDA button opens the User LDA screen. Select a lens table and press the wheel. After calibrating the lens motors, the LDS functionality can be used.

Figure 85: USER LDA screen

To add a lens table from the main archive, access the User LDA screen and press the ADD button. This opens the MAIN LDA screen. From the main archive, first select a lens type, then a lens model and then a lens class. The lens class can be found on the lens barrell below the infinity symbol of the focus scale. Select to add the lens table to the user list (Press ADD), use it without adding (USE), or both (ADD+USE).

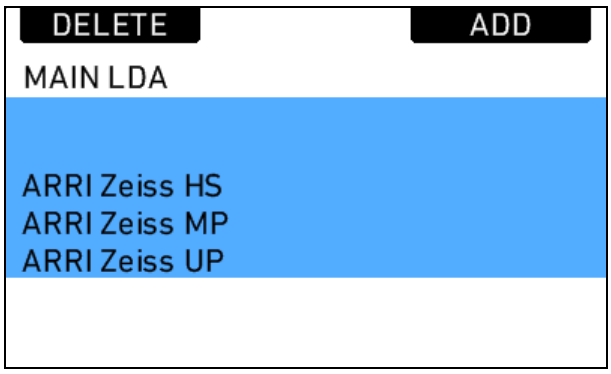


Figure 86: Main LDA screen

To delete a lens table from the user archive, access the user list and press the DELETE button. Select the lens table to delete and press the two buttons labelled DELETE simultaneously.

Custom lens tables can be added to the main archive via the SD card. Place the lens table on the SD card in a folder named "LDA". Insert the SD card into the camera. Go to the main archive list and press ADD. Select the desired lens table and press the wheel. The lens table will be located in the main archive as lens type "Custom".

It is possible to inverse the iris, zoom and focus scales for lens tables if necessary. Press OPTIONS on the USER LDA screen to access the LDA OPTIONS screen, where these adjustments can be made.

Lenses can also be equipped with the lens data mount LDM. The mount contains a chip with the lens table stored inside, so the lens transmits its data to the camera as soon as it is connected. For information on current ring positions, these lenses must be used in combination with controlled lens motors.

CLM screens

The screens for IRIS, FOCUS and ZOOM controlled lens motors all have the same layout. They show the motor type, motor direction and motor torque.

Note: For CLM-2 motors the torque value is greyed out as torque is only active for CLM-3 motors. It can nonetheless be changed in case a CLM-3 motor might be used but is currently not at hand.

In addition, a lens motor calibration can be triggered, either for all lens motors, or only for the one featured in the particular screen.

Note: When starting a motor calibration, make sure each motor's cog wheel is connected properly to the lens. Pay extra attention that no one is close to the motors or holding them. Catching a finger, cloth or anything else on the motor's cog wheel can cause sever body harm as well as damage to the system.

IRIS CLM

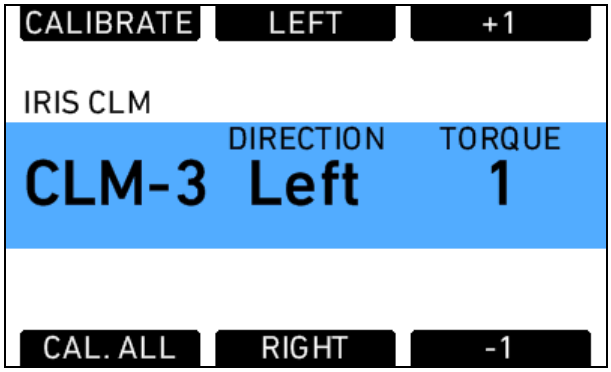


Figure 87: Iris CLM screen

Shows status, direction and torque of the CLM connected to the IRIS socket.

Press the IRIS CLM screen button to access the IRIS CLM screen. This screen shows the type of motor connected to the IRIS socket, its direction and torque. Direction and torque can be changed by the screen buttons below and above the value. The upper left screen button calibrates only the iris motor.

Pressing the lower left screen button starts calibration of all connected lens motors.

ZOOM CLM

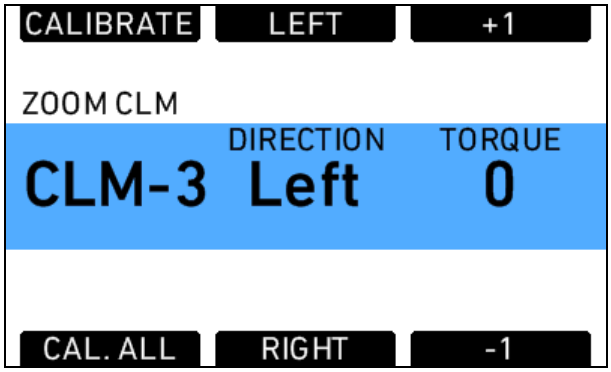


Figure 88: Zoom CLM screen

Shows status, direction and torque of the CLM connected to the ZOOM socket.

Press the ZOOM CLM screen button to access the ZOOM CLM screen. This screen shows the type of motor connected to the ZOOM socket, its direction and torque. Direction and torque can be changed by the screen buttons below and above the value. The upper left screen button calibrates only the zoom motor.

Pressing the lower left screen button starts calibration of all connected lens motors.

FOCUS CLM

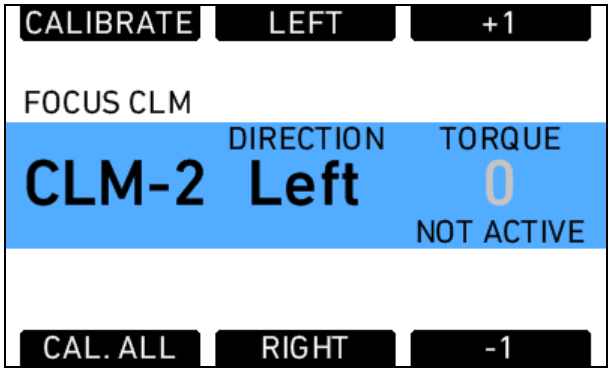


Figure 89: Focus CLM screen

Shows status, direction and torque of the CLM connected to the FOCUS socket.

Press the FOCUS CLM screen button to access the FOCUS CLM screen. This screen shows the type of motor connected to the FOCUS socket, its direction and torque. Direction and torque can be changed by the screen buttons below and above the value. The upper left screen button calibrates only the focus motor.

Pressing the lower left screen button starts calibration of all connected lens motors.

3D Lens Sync

When two cameras are connected and their sensors are synced with via the EXT connectors, the slave camera will receive its motor commands from the master camera. Its radio module switches automatically off. Calibration of lens motors must happen individually for each camera.

14 ALEXA Plus 4:3

The ALEXA Plus 4:3 is identical to an ALEXA Plus except for its ALEV III sensor which has a 4:3 active area. This makes the camera the ideal companion camera to an ALEXA Studio.

Licenses

The ALEXA Plus 4:3 includes a bundle license, which enables DNxHD, High Speed recording and anamorphic desqueeze. The license is pre-installed on the camera and cannot be deleted.

Note: On ALEXAs with XR module, DNxHD will be available again in a later SUP version.

Note: Do not downgrade the camera to a software version before SUP 6.1.

4:3 mode

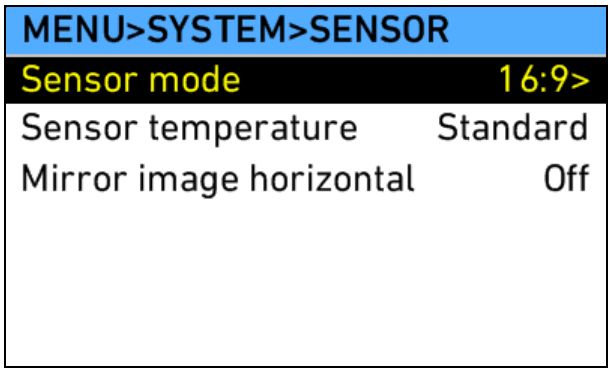
In 4:3 mode, the camera captures images from a vertically extended sensor area. The used area is 23.76 x 17.82mm in size, which translates to 2880 x 2160 sensor photo sites.

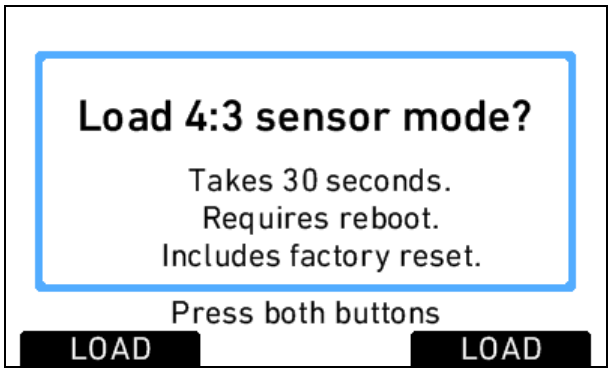
Note: The sensors of standard ALEXA and ALEXA Plus cameras can only be operated in 16:9 mode.

To change the sensor mode:

1. In the System menu, select Sensor.
2. Select Sensor mode. The current sensor mode is indicated on the top line on the SENSOR screen.
3. Press the jogwheel to select 16:9 or 4:3 sensor mode.

4. Press the **LOAD** buttons simultaneously to load the new sensor mode.
   Loading the new sensor mode takes approximately 30 seconds including a mandatory camera reboot. A progress bar indicates the sensor mode loading progress.





Note: Switching from 16:9 to 4:3 and vice versa always includes a factory reset.

Frame rate

The maximum sensor frame rate in 4:3 is 48 fps.

4:3 and Highspeed Mode

It is possible to switch from 4:3 to High Speed mode and vice versa. If recording is set to ProRes, only the 16:9 center area of the image sensor is read out. If recording is set to ARRIRAW (only available for ALEXAs with XR module), 4:3 High Speed is available.

Recording

Internal recording is only possible with ProRes codecs in 2K (2048x1536) resolution, and ARRIRAW on ALEXAs with XR module.

External recording is only possible in ARRIRAW on ALEXAs with SxS module (except ALEXA HD and ALEXA HD Plus) and with recorders that support ARRIRAW 4:3.

Monitoring

For monitoring, the 4:3 image is downscaled to 960 x 720 pixels for the EVF and 1440 x 1080 for the MON OUT. Only horizontal surround view is available in 4:3 mode. The image is not rescaled for surround view, but horizontally extended. The non-active area of the EVF and MON OUT is filled with black ("pillarboxed").

Anamorphic desqueeze

Both 1.3x and 2x anamorphic desqueeze is available in 4:3 mode. 1.3x anamorphic desqueeze results in an image size of 1280 x 720 for the EVF and 1920 x 1080 for the MON OUT, while 2x desqueeze results in an image size of 1280 x 480 for the EVF and 1920 x 720 for the MON OUT.

For the optical viewfinder, anamorphic desqueeze can be achieved by flipping an anamorphic element into the optical path. By default, the OVF has an optical element for 2x desqueeze. Elements for 1.3x desqueeze are also available.

15 ALEXA Studio

The ALEXA Studio extends the features of an ALEXA Plus 4:3 by:

- Optical viewfinder
  Brand-new construction from ARRI, featuring optical anamorphic desqueeze, diopter correction, image flip, camera left/right positioning and horizontal distance adjustment
- Electronic mirror shutter
  The electronic mirror shutter can be adjusted in a range of 11.2° to 180.0° degrees. When in use, it completely removes rolling shutter effects of the sensor.
- Built-in motorized ND filter
  The ND filter has a density of 1.3 (= 4.3 stops) and can be moved in and out of the optical path with the push of a button. It is located between the mirror shutter and the image sensor, so the optical viewfinder image is not affected by the filter and stays bright.

15.1 ALEXA Studio Images

The following images show the ALEXA Studio with SxS module:

Figure 90: ALEXA Studio right

Figure 91: ALEXA Studio left

Figure 92: ALEXA Studio top

Figure 93: ALEXA Studio bottom

Figure 94: ALEXA Studio front

Figure 95: ALEXA Studio back

The following images show the ALEXA Studio with XR module:

Figure 96: ALEXA Studio right

Figure 97: ALEXA Studio left

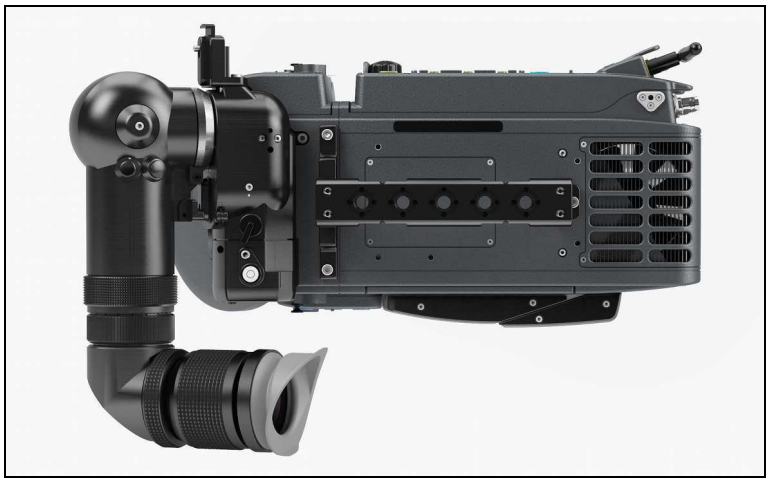


Figure 98: ALEXA Studio top

Figure 99: ALEXA Studio bottom

Figure 100: ALEXA Studio front

Figure 101: ALEXA Studio back

15.2 Optics

15.2.1 Electronic Mirror Shutter

The electronic mirror shutter is located between the PL-mount and the image sensor at an angle of about 45°. It is part of the optical reflex viewfinder system that reflects the lens image into the optical viewfinder.

It is synchronized with the electronic shutter of the camera sensor so that the sensor is only read out in the dark phase. This completely removes rolling shutter effects of the sensor readout.

Its 180° mirrored surface reflects the lens image into the optical viewfinder. The open sector of the mirror shutter can be reduced through an electronically controlled sector gate. The mirror shutter rotates 360° for every capured frame, controlling the exposure of the sensor through its open sector. The readout of the sensor happens while the mirror reflects the light of the optical path into the optical viewfinder.

The angle of the open sector is electronically controlled via the regular camera controls.

15.2.2 Lens Adapter PL Mount LA-PL-2 (with LDS)

The lens mount of the ALEXA Studio supports the ARRI Lens Data System. The LDS lens must be mounted in the 12 o'clock or 3 o'clock position to enable the LDS functions. Take great care not to harm any elements of the LDS contacts on either lens or camera when attaching or deattaching a lens or lens port cover.

Besides the LDS feature, the same rules as with the *LA-PL-1* (on page 60) apply.

Figure 102: ALEXA Studio PL-Mount

Note: Due to the optical mirror shutter, Angenieux Optimo Rouge lenses, any Super16 lenses, or lenses with dimensions not matching the dimensions in the figure "Allowed lens dimensions with mirror shutter" drawing cannot be used with the ALEXA Studio, as they would destroy the rotating mirror shutter!

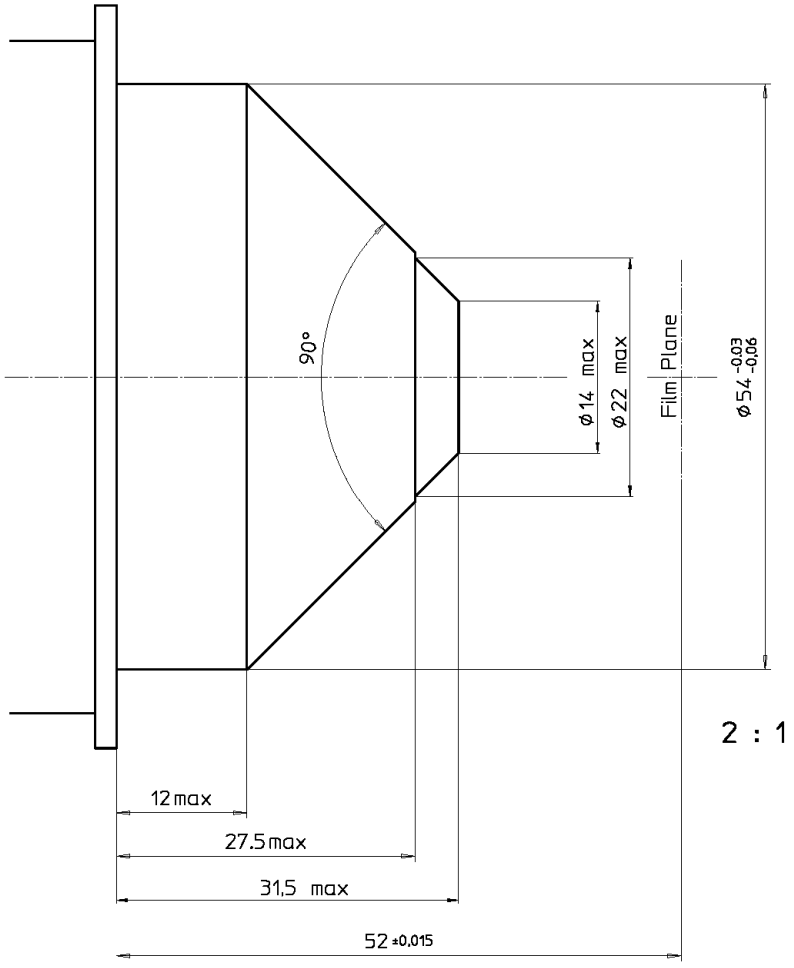


Figure 103: Allowed lens dimensions with mirror shutter

15.2.3 Optical Viewfinder

The ALEXA Studio has an optical reflex viewfinder system with interchangeable ground glasses.

It offers an exceptional viewing quality favoured by a large optical design. Special care has been taken to avoid the unpleasant vignette effect that could occur by moving the eye.

Note: To use the optical viewfinder, the mirror shutter must be set to On.

The viewfinder is adjustable in two axes, laterally extendable for left eye operation and shows illuminated frame lines (ARRIGLOW).

The viewfinder image stays upright and correct left-to-right when the viewfinder is swivelled within the main axis.

Figure 104: OVF top view, with mounting points marked

Extending the viewfinder arm

- Loosen the straight-structured ring next to the FIX engraving counter-clockwise (contrary to the arrow).
- Adjust the horizontal position.
- Tighten the ring clockwise (with the arrow direction).

Adjust Barrel Friction

- Move the dot-structured ring according to the engravings LOOSE and FRICTION to loosen or tighten the friction of the OVF barrel.

Contrast Filter

To achieve a temporary subjective reduction of viewfinder contrast range, a contrast filter (density 0.6) can be pivoted into the optical beam path.

- Use the lever next to the level bubble to pivot the contrast filter into the optical path.
- Releasing the lever pivots the contrast filter back out of the optical path.

Ground glasses

The ground glass is the equivalent to the image sensor for the optical viewfinder. The image created by the lens is projected to the ground glass, from where it is picked up by the optical viewfinder.

Ground glasses contain frame and format markings to show the recorded image area and the area of interest. The sensor aperture of the ALEXA Studio is different from the camera aperture of ANSI and DIN Super35 formats. Therefore, Super35 ground glasses of the ARRICAM system do not provide exact frame markings in the ALEXA Studio viewfinder image. For exact framing, use only ground glasses made specifically for the ALEXA Studio.

To exchange a ground glass:

- Press the VIEW button so that the sensor is protected by the mirror shutter.
- Turn off the camera and disconnect it from power supply.
- Remove the lens or protective cap.
- Screw the ARRI Ground Glass Puller into the ground glass.
- Carefully pull out the ground glass.
- Check that the new ground glass and the ground glass holder are clean.
- Screw the ARRI Ground Glass Puller into the new ground glass and push it into the holder.
- Make sure the ground glass is inserted completely and correctly locked in place.
- Attach a lens or a protective cap to the lens mount.

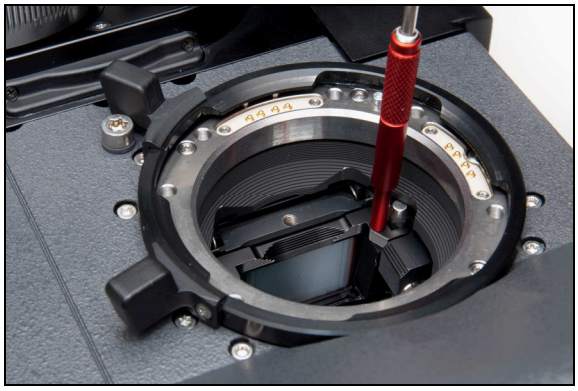


Figure 105: Ground glass in camera with Ground Glass Puller attached

Figure 106: Ground glass with attached Ground Glass Puller

To remove the field lens, which is located above the ground glass:

- Remove the ground glass first
- Screw the ARRI Ground Glass Puller into the field lens
- Carefully pull out the field lens

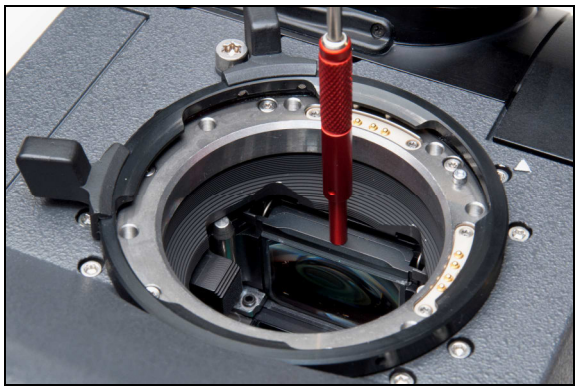


Figure 107: Field lens in camera with attached Ground Glass Puller

Figure 108: Field lens with attached Ground Glass Puller

Note: Due to the risk of displacement caused by shock force, we recommend to remove both ground glass and field lens before transportation and shipping of the camera. Whenever removing the camera from its case, check that both ground glass and field lens are properly seated before switching on the camera to prevent any damage to the mirror shutter.

FRAMEGLOW

The FRAMEGLOW module is integrated in the optical viewfinder system of the ALEXA Studio. It allows illuminated format markings to be superimposed onto the viewfinder image with adjustable brightness.

- Press the buttons on the left side of the OVF below the DIMMER engravement to adjust the brightness of the FRAMEGLOW. At its lowest brightness setting, the FRAMEGLOW is switched off.
- The FRAMEGLOW color is set in the camera menu under MENU>Monitoring>Frame lines> Frame lines color

Figure 109: FRAMEGLOW buttons

Changing the FRAMEGLOW mask

The ground glass used for the optical viewfinder should be combined with a matching frameglow mask. To change the frameglow mask:

- Loosen the 3mm allen screw next to the level bubble.
- Remove the level bubble element.
- Grab the glow mask with a Hirschmann clamp at the forceps hole and pull it out of the glow mask frame.
- Check that both the new glow mask and the glow mask frame are clean.
- Carefully push the new glow mask into the glow mask frame.
- Make sure the glow mask is inserted completely.

- Place the bubble element on top of the FRAMEGLOW module and tighten the 3mm allen screw.
- Turn on the FRAMEGLOW and check that ground glass and glow mask are correctly aligned.

Figure 110: Glow mask slot

Anamorphic Desqueeze

- Turn the wheel on top of the OVF ball element to swing the anamorphic desqueeze element into the optical path.
- *Note: By default, the anamorphic element is for 2x anamorphic lenses. It can be changed to an element for 1.3x anamorphic lenses.*

Image Flip

- Press the button next to the image flip symbol.
- Turn the knob next to the image flip symbol until the image is fully flipped.
- To undo the flip, rotate the knob until the button jumps out and the knob is locked again.

Diopter Adjustment

- *Note: Depends on the eyepiece in use. Description for default eye piece of ALEXA Studio.*
- Turn the eyepiece barrel until the ground glass is in focus.
- A neutral, unstructured, bright out-of-focus image content (which can be achieved by removing the lens and pointing the camera at a bright area) helps with this.

Attaching the optical viewfinder

Upon delivery, the OVF is not connected to the camera and must be installed by the user.

- Remove the protective cover from the OVF by loosening its 2x 3mm allen screws.
- Remove the cover plate from the camera by loosening its 2x 3mm allen screws.
- Place the OVF on the camera.
- Take special care that the electronic connectors of camera and viewfinder are connected before pushing the OVF in place.
- Tighten the 3x 3mm allen screws of the OVF (See OVF top view image for locations of screws).

Note: The torx screws on the camera that are painted red may not be tightened or loosened, as this would corrupt the alignment of the OVF.

Figure 111: OVF with cover plate

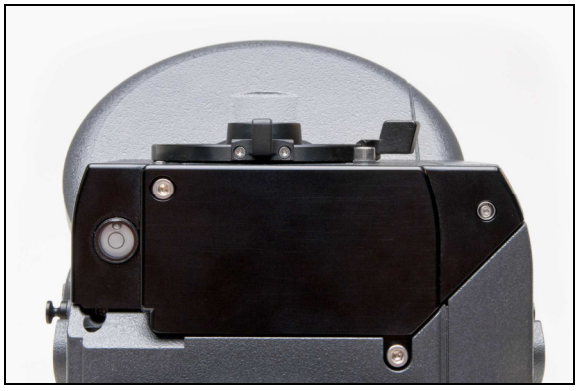


Figure 112: Alexa Studio with cover plate

Swapping the optical viewfinder for an electronic viewfinder EVF-1

- Make sure the camera is powered down.
- Loosen the 3x 3mm hex screws of the OVF completely (See OVF top view image for locations of screws).
- Remove the optical viewfinder.
- Place the EVA-1 electronic viewfinder adapter plate where the optical viewfinder was.
- Tighten the 2x 3mm hex screws.
- Attach the EVF mounting bracket with the EVF-1 to the camera housing with its 2x 3mm allen screws.
- Connect the EVF cable to the camera.
- Power the camera.

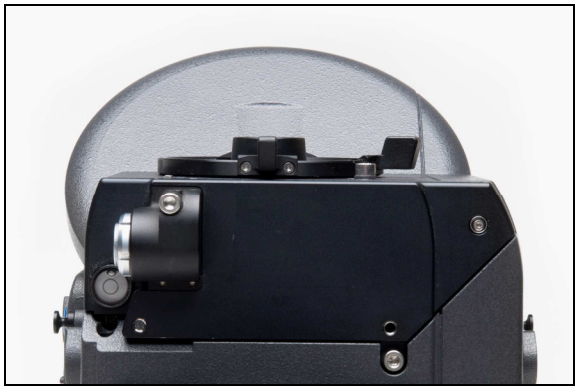


Figure 113: Electronic viewfinder adapter EVA-1

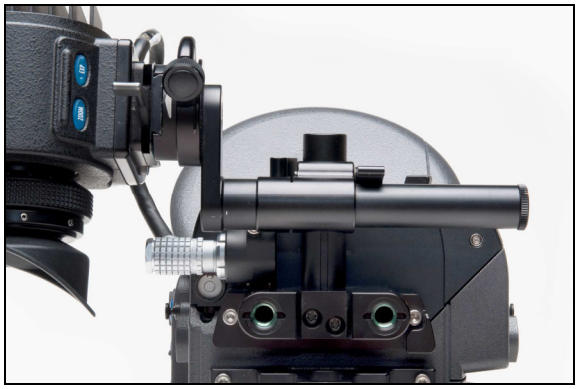


Figure 114: ALEXA Studio with mounted EVF-1

15.2.4 ND Filter

The ALEXA Studio has a ND filter in front of the sensor, which can be moved in and out of the optical path. The motorized filter slider contains a ND filter with a density of 1.3 (= 4.3 stops), and a cover glass without additional density. The filter slider is sealed, so that no dirt or dust can enter the area between the slider and the sensor.

Note: Perform regular dust checks on the outside of the ND filter slider, as dust might collect on top of it. As the slider is very close to the sensor, dust or dirt collecting on it might be visible as artifacts in images.

When performing a dust check, make sure the camera is switched off and disconnected from any power source to prevent the mirror shutter from activation during the cleaning process.

The ND filter can be activated in the EI screen by pushing the lower right screen button.

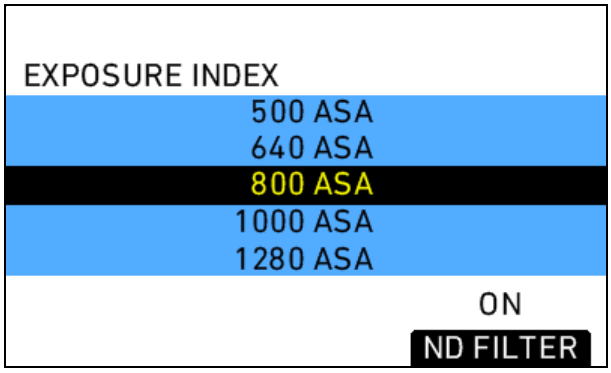
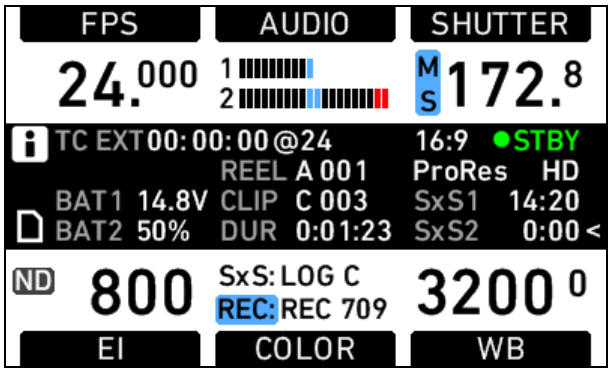


Figure 115: EI screen

If activated, the ASA rating in the HOME screen will have an ND index next to it.

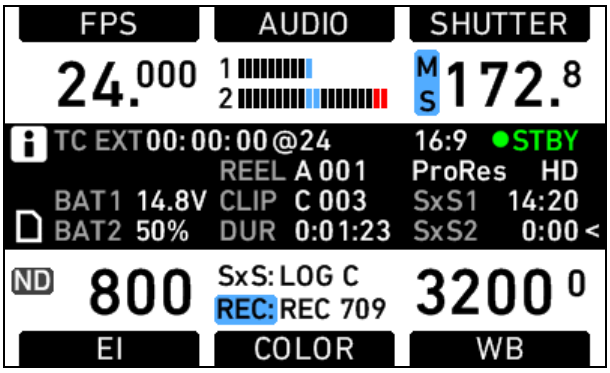


Note: The use of the internal ND filter has no influence on the EI rating of the camera. When measuring exposure with a light meter, take into account the light loss of 4 1/3 stops generated by the ND filter.

15.3 Studio Camera Controls

Only a few additional controls are available on the ALEXA Studio. These are used to control the mirror shutter and the ND filter.

The HOME screen has icons for the active ND filter and the mirror shutter position and state.



Icon	Meaning
ND	ND filter is active
G	Mirror is on and parked in gate position (Grey icon if mirror shutter is switched off)
V	Mirror is on and parked in view position (Grey icon if mirror shutter is switched off)
M S	Mirror shutter is running

ND filter activation

- On the HOME screen, press **EI**.

- On the EI screen, press **ND FILTER** to move the ND filter in and out of the optical path.

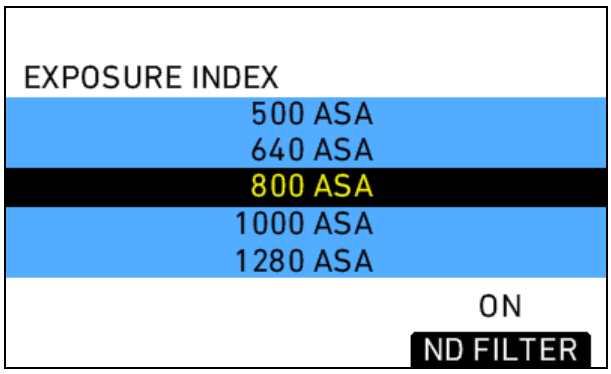
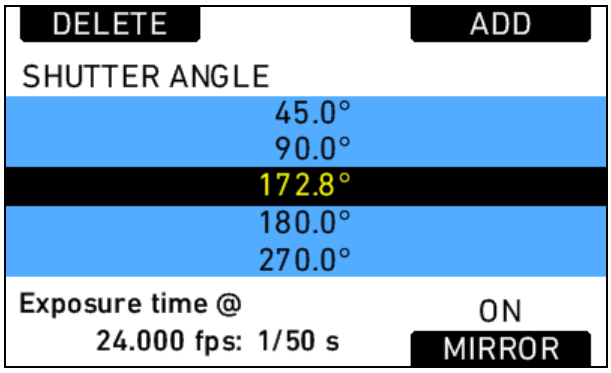


Figure 116: EI screen

Mirror shutter activation

- On the HOME screen, press **SHUTTER**.
- On the SHUTTER ANGLE screen, press **MIRROR** to activate or deactivate the mirror shutter.



Note: When mirror shutter is active, the shutter angle is limited to 180.0 degrees. Frame rates higher than 37 fps for 4:3 and higher than 48 fps for 16:9 reduce the shutter angle range further.

Note: For frame rates higher than 30 fps, it is recommended to use a power source with a voltage level of 18-35 V to ensure the mirror shutter is powered sufficiently.

MIRROR PARK buttons VIEW and GATE

The camera left side Operator Controls have two additional function buttons labelled VIEW and GATE. These buttons control the parking position of the mirror shutter.

A spinning mirror shutter can be stopped by pressing either of the two buttons. Pressing the VIEW button will park the mirror in the optical path, enabling a live preview in the optical viewfinder.

Pressing the GATE button will stop the mirror shutter out of the optical path, enabling a live preview on the MON OUT and the REC OUT, and the EVF in case it is mounted to the camera. Each button is accompanied by a blue LED that lights when the mirror is parked in the respective position. When the mirror shutter is running, both of the LEDs will be active.

Pressing the GATE button while the mirror is parked in the VIEW position will move the mirror shutter by 180.0° degrees into the GATE position.

Pressing the VIEW button while the mirror is parked in the GATE position will move the mirror shutter by 180.0° degrees into the VIEW position.

To restart the mirror shutter, press both VIEW and GATE simultaneously.

Note: After booting the camera, the mirror shutter is parked in the GATE position for safety reasons.

When stopping, the mirror shutter always opens up the electronic sector gate to 180.0°, and closes down when it is restarted.

A live image on EVF, MON OUT and REC OUT is available when the mirror shutter is spinning or parked in the GATE position. A parked mirror shutter will automatically start spinning when recording is started.

When the mirror shutter is switched off, it is parked in the GATE position.

Note: For safety reasons, it is required to power down the camera before performing a "gate check". Do not check or clean the sensor cover glass while the camera is powerded up and the mirror is parked in the GATE position!

Frame rate and shutter angle with mirror shutter on

When the mirror shutter is switched on, the sensor frame rate is limited to 60 fps in 16:9 and 48 fps in 4:3.

Frame rates higher than 37 fps in 4:3 or 48 fps in 16:9 reduce the maximum possible mirror shutter angle. When the frame rate change reduces the allowed mirror shutter angle below the currently active shutter angle, the camera automatically sets the shutter angle to 135.0°. The technically possible maximum shutter angle depends on the frame rate.

To set the maximum available shutter angle:

1. Press the **SHUTTER** button on the HOME screen to get to the SHUTTER ANGLE screen.
2. Press the **ADD** button on the SHUTTER ANGLE screen to get to the SHUTTER ANGLE ADD screen.
3. Press the **MAX** button on the SHUTTER ANGLE ADD screen and confirm by pressing the jogwheel twice.

The maximum available shutter angle is now a part of the shutter list and can be set by pressing the jogwheel.

When the mirror shutter is on, the camera redirects the user to the SHUTTER ANGLE screen after setting the sensor frame rate, where the shutter angle can be adjusted as desired. To cancel this action, press the HOME button.

15.4 4:3 Mode

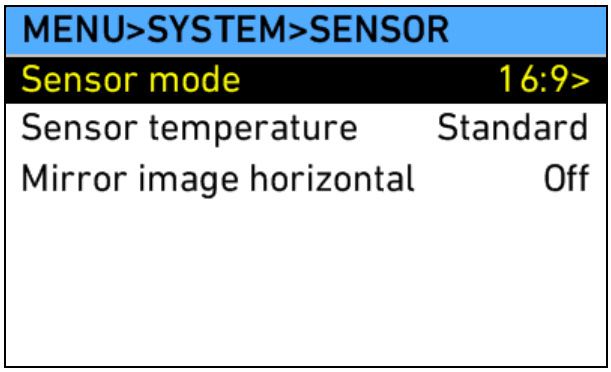
In 4:3 mode, the camera captures images from a vertically extended sensor area. The used area is 23.76 x 17.82mm in size, which translates to 2880 x 2160 sensor photo sites.

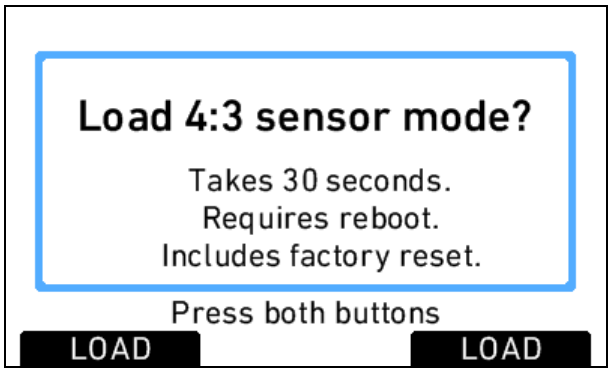
Note: The sensors of standard ALEXA and ALEXA Plus cameras can only be operated in 16:9 mode.

To change the sensor mode:

1. In the System menu, select Sensor.
2. Select Sensor mode. The current sensor mode is indicated on the top line on the SENSOR screen.
3. Press the jogwheel to select 16:9 or 4:3 sensor mode.

4. Press the **LOAD** buttons simultaneously to load the new sensor mode.
   Loading the new sensor mode takes approximately 30 seconds including a mandatory camera reboot. A progress bar indicates the sensor mode loading progress.





Note: Switching from 16:9 to 4:3 and vice versa always includes a factory reset.

Frame rate

The maximum sensor frame rate in 4:3 is 48 fps.

4:3 and Highspeed Mode

It is possible to switch from 4:3 to High Speed mode and vice versa. If recording is set to ProRes, only the 16:9 center area of the image sensor is read out. If recording is set to ARRIRAW (only available for ALEXAs with XR module), 4:3 High Speed is available.

Recording

Internal recording is only possible with ProRes codecs in 2K (2048x1536) resolution, and ARRIRAW on ALEXAs with XR module.

External recording is only possible in ARRIRAW on ALEXAs with SxS module (except ALEXA HD and ALEXA HD Plus) and with recorders that support ARRIRAW 4:3.

Monitoring

For monitoring, the 4:3 image is downscaled to 960 x 720 pixels for the EVF and 1440 x 1080 for the MON OUT. Only horizontal surround view is available in 4:3 mode. The image is not rescaled for surround view, but horizontally extended. The non-active area of the EVF and MON OUT is filled with black ("pillarboxed").

Anamorphic desqueeze

Both 1.3x and 2x anamorphic desqueeze is available in 4:3 mode. 1.3x anamorphic desqueeze results in an image size of 1280 x 720 for the EVF and 1920 x 1080 for the MON OUT, while 2x desqueeze results in an image size of 1280 x 480 for the EVF and 1920 x 720 for the MON OUT.

For the optical viewfinder, anamorphic desqueeze can be achieved by flipping an anamorphic element into the optical path. By default, the OVF has an optical element for 2x desqueeze. Elements for 1.3x desqueeze are also available.

15.5 Licensed Features

Licenses for features DNxHD, High Speed mode and Anamorphic Desqueeze are automatically enabled in the ALEXA Studio.

16 ALEXA M

The ALEXA M is a specialty camera where the camera is split into two parts. The camera head contains the image sensor, while the body contains the image processing modules. Both parts are connected via a fibre interface.

The advantages of this system are:

- Better access to small spaces where a regular ALEXA would not fit into
- Lighter handheld operation.
- Lighter and smaller setups on 3D rigs
- Easy camera operability when the camera head cannot be accessed, e.g. a camera crane or a helicopter rig.

16.1 ALEXA M Images

The following images show the ALEXA M head:

Figure 117: ALEXA M head left

Figure 118: ALEXA M head right

Figure 119: ALEXA M head front

Figure 120: ALEXA M head back

Figure 121: ALEXA M head top

Figure 122: ALEXA M head bottom

The following images show the ALEXA M body with SxS module:

Figure 123: ALEXA M body left

Figure 124: ALEXA M body right

Figure 125: ALEXA M body top

Figure 126: ALEXA M body bottom

Figure 127: ALEXA M body front

Figure 128: ALEXA M body back

The following images show the ALEXA M body with XR module:

Figure 129: ALEXA M body right

Figure 130: ALEXA M body left

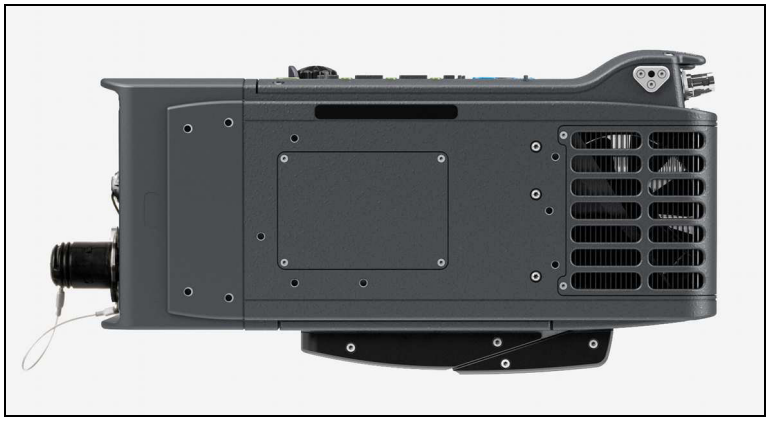


Figure 131: ALEXA M body top

Figure 132: ALEXA M body bottom

Figure 133: ALEXA M body front

Figure 134: ALEXA M body back

16.2 ALEXA M Camera Head

The ALEXA M camera head contains the image sensor and parts of the image processing. Images are transmitted to the body via fibre cable. The fibre connection is bi-directional and returns the EVF image to the camera head from the body.

Due to the fibre connection, the ALEXA M has an increased power draw of approximately 120W, with the head drawing 40W. The head can be powered from the body with hybrid fibre cables of up to 30m length.

Note: When powering the head from the body, power supplies with at least 24V output must be used, due to the voltage drop over the hybrid cable.

The head can also be powered directly through its BAT connector, if the battery delivers at least 40W of power.

16.2.1 CCH-2

The Camera Center Handle 2 CCH-2 is the handle for the ALEXA M camera head. It is mounted with 4x 3mm allen screws and can be attached either to the top or the bottom of the camera head.

Figure 135: CCH-2 mounted on ALEXA M camera head

Note: The CCH-2 only fits the ALEXA M camera head and not the ALEXA M body or any other ALEXA camera.

16.3 ALEXA M Camera Body

The ALEXA M camera body contains the main controls, image processing, output and recording. It behaves like any regular ALEXA, only that it lacks the operator controls and is slightly longer.

16.4 Fibre Connection

Figure 136: SMPTE 311optical fibre connectors

The ALEXA M utilizes SMPTE 311 fibre connectors and cables. The camera head can be powered with hybrid fibre/power cables with a length of up to 30m, if the body power supply can deliver 120 W in total.

Note: When powering the camera head from the body, the power supply must have an output of at least 24V due to a voltage drop over the hybrid cable.

If this is not the case, the head should be powered separately through its BAT connector with a power supply that delivers at least 40W of power.

For regular fibre cable, a signal loss of up to 10 dB is acceptable. 1 km of fibre cable has a signal loss of 0.5 dB, while a fibre connector pair introduces a signal loss of 0.5-2 dB, depending on the amount of dirt on the optical contacts. Typically, a cable length of up to 1 km with 4 connection joints is still acceptable.

To connect the cable to the camera, make sure the cable direction is correct. Line up the red guides and push the cable connector onto the camera connector piece. A clicking sound indicates the connector has locked. Plug the rubber caps of the connectors into each other to protect their inside from dirt.

To disconnect the cable from the camera head, pull on the rubber end of the connector in the direction of the cable. To disconnect the cable from the body, push the metal ring of the camera connector piece and pull on the cable connector in the opposite direction.

Connect the camera head to the body via the optical link before powering the camera. Disconnecting the head from the body during operation requires both parts to be powered down and reconnected before powering up the system again.

Figure 137: Correctly aligned fibre connectors

Cleaning of fibre connectors

Cleaning of the fibre connectors is an important task. Only use cleaning devices certified for SMPTE 311 connectors, like the “IBC M20” which is delivered with the camera package. Never use compressed air or any other uncertified cleaning method, as this could permanently damage or destroy the fibre connectors.

Both dry and wet cleaning tools are available, with the dry cleaners having proved to be more efficient for regular cleaning, while the wet cleaners are better with strong and sticky contaminations.

Regular cleaning of at least one time per day is recommended, as well as any time the signal quality deteriorates.

Fibre connection status

Next to the fibre connectors of the ALEXA M is a fibre status LED that reflects the signal strength.

A green LED reflects a good signal strength.

If the LED is alternately flashing between green and amber, the signal is weak, which can be caused by dirty connectors, faulty cables, or a bad connection. Power down the camera, clean the connectors, reconnect the cable to the camera and repower the camera in this particular order. If the problem does not go away, swap the cable.

An amber LED indicates a link error. The camera must be rebooted. If the link error reoccurs, follow the steps described for the green/amber flashing LED.

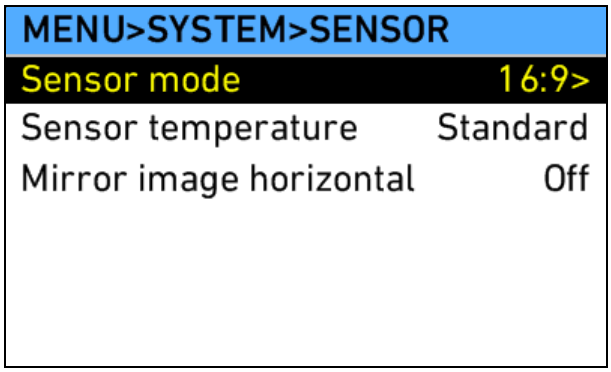
16.5 4:3 Mode

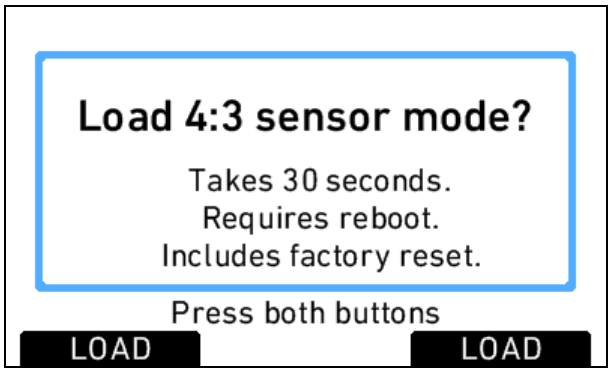
In 4:3 mode, the camera captures images from a vertically extended sensor area. The used area is 23.76 x 17.82mm in size, which translates to 2880 x 2160 sensor photo sites.

Note: The sensors of standard ALEXA and ALEXA Plus cameras can only be operated in 16:9 mode.

To change the sensor mode:

1. In the System menu, select Sensor.
2. Select Sensor mode. The current sensor mode is indicated on the top line on the SENSOR screen.
3. Press the jogwheel to select 16:9 or 4:3 sensor mode.
4. Press the **LOAD** buttons simultaneously to load the new sensor mode.
   Loading the new sensor mode takes approximately 30 seconds including a mandatory camera reboot. A progress bar indicates the sensor mode loading progress.





Note: Switching from 16:9 to 4:3 and vice versa always includes a factory reset.

Frame rate

The maximum sensor frame rate in 4:3 is 48 fps.

4:3 and Highspeed Mode

It is possible to switch from 4:3 to High Speed mode and vice versa. If recording is set to ProRes, only the 16:9 center area of the image sensor is read out. If recording is set to ARRIRAW (only available for ALEXAs with XR module), 4:3 High Speed is available.

Recording

Internal recording is only possible with ProRes codecs in 2K (2048x1536) resolution, and ARRIRAW on ALEXAs with XR module.

External recording is only possible in ARRIRAW on ALEXAs with SxS module (except ALEXA HD and ALEXA HD Plus) and with recorders that support ARRIRAW 4:3.

Monitoring

For monitoring, the 4:3 image is downscaled to 960 x 720 pixels for the EVF and 1440 x 1080 for the MON OUT. Only horizontal surround view is available in 4:3 mode. The image is not rescaled for surround view, but horizontally extended. The non-active area of the EVF and MON OUT is filled with black ("pillarboxed").

Anamorphic desqueeze

Both 1.3x and 2x anamorphic desqueeze is available in 4:3 mode. 1.3x anamorphic desqueeze results in an image size of 1280 x 720 for the EVF and 1920 x 1080 for the MON OUT, while 2x desqueeze results in an image size of 1280 x 480 for the EVF and 1920 x 720 for the MON OUT.

For the optical viewfinder, anamorphic desqueeze can be achieved by flipping an anamorphic element into the optical path. By default, the OVF has an optical element for 2x desqueeze. Elements for 1.3x desqueeze are also available.

16.6 Licensed Features

Licensed features High Speed recording and Anamorphic desqueeze are automatically enabled in the ALEXA M.

16.7 Lens Data System

The ALEXA M is equipped with a LA-PL-2 lens mount with LDS contacts. When using a LDS lens, such as Master Primes or LDS Ultra Primes, the camera reads, displays and records lens metadata.

The LDS screen can be accessed through the menu, which contains an additional item "LDS". This menu item is only available on the ALEXA M.

Note: Lens motors and the Lens Data Archive LDA are not supported by the ALEXA M.

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17 ALEXA XT models

With the ALEXA XT cameras (Xtended Technology), ARRI is refreshing the ALEXA product line, incorporating new features inspired by feedback from professional users. These features expand on the benefits that have already made ALEXA such an extraordinary success – highest overall image quality and lowest overall production cost through reliability, ergonomics and efficient workflows.

The ALEXA XT, ALEXA XT M, ALEXA XT Plus and ALEXA XT Studio cameras replace all previous models except for the original ALEXA. Owners of existing ALEXA cameras will be able to purchase individual upgrades that deliver most of the features of the ALEXA XT configuration.

In the following, the features that are common to all ALEXA XT models are listed.

XR Module

All ALEXA XT models include the XR (Xtended Recording) module, which provides longer recording times and in-camera ARRIRAW recording onto XR Capture Drives. For more details, please refer to Section *XR (Xtended Recording)* (on page 56).

4:3 Mode

All ALEXA XT models support the 4:3 sensor mode, as described in Section *Sensor modes 16:9 and 4:3* (on page 158).

Licenses

All ALEXA XT models include the following licenses:

- Anamorphic desqueeze
- High speed

LDS PL Mount

All ALEXA XT models are equipped with an LDS-capable PL mount for ubiquitous lens metadata. For more details, please refer to Section *Lens Adapter PL-Mount LA-PL-2 (with LDS)* (on page 162).

Viewfinder mounting

Never satisfied with good-enough, ARRI engineers have scrutinized the ALEXA viewfinder bracket and come up with a stronger, more rigid design. Two 15 mm lightweight rods are used by the new Viewfinder Mounting Bracket VMB-3, creating extra sturdiness and allowing the use of accessories such as lens motors, follow focus units or matte boxes. Attaching such accessories to the viewfinder bracket removes clutter from the camera's base plate, facilitating rapid changes in camera support, i.e. from a tripod to a crane or Steadicam. A special anodizing process is used on all moving parts for a very hard yet low-friction surface.

Also available as a separate accessory is the new Viewfinder Extension Bracket VEB-3, with a new and sturdy design and a fold-out arm that holds the viewfinder securely in place when moving the camera.

Super silent XT fan

ALEXA cameras are already among the quietest digital cameras, but an even quieter fan has become available and ARRI has incorporated this new fan into the ALEXA XT models, providing an extra safety margin in very quiet or very hot environments.

17.1 In-Camera Filter Module IFM-1

The In-Camera Filter Module IFM-1 is standard to all ALEXA XT models (except ALEXA XT Studio). For ALEXA Classic models (except ALEXA Studio), there is an IFM-1 upgrade. Both replace the conventional reflex tube that is located inside the PL lens mount tube with the IFM filter holder and allow the use of ARRI Full Spectrum Neutral Density (FSND) filters (available separately).

By using internal filters you can rate the camera at the base sensitivity of EI 800 without the need for external filters, even in bright light conditions. In-camera filters for IFM-1 add only 14 grams of weight.

DO NOT POINT THE CAMERA INTO DIRECT SUNLIGHT, VERY BRIGHT LIGHT SOURCES, OR HIGH-ENERGY LIGHT SOURCES (e.g. laser beams)! This may cause permanent damage to the internal filter or the camera.

Note: Internal filtration requires additional shimming and does not work with ALEXA Studio or ALEXA XT Studio. For PL mount lenses, the IFM-1 filters work only with a lens mounting depth of 31.50 mm maximum.

Benefits of in-camera filtration

Filtering behind the lens rather than in front reduces weight, reflections and operational complexity. The filters' in-camera position significantly reduces the camera's total and front weight (because internal filters are smaller and lighter than external ones).

Also, internal filters are far less exposed to damage than external ones and, since lenses are changed more frequently than ND filters, the FSND filters provide extra protection for the sensor.

The Full Spectrum Neutral Density (FSND) filters for IFM-1 are based on new technologies that assure highest image quality. An absorptive full spectrum ND coating attenuates the light while maintaining a perfectly neutral color balance at all densities.

A base of water-white optical glass, precision-polished to create perfectly parallel surfaces, guarantees a clear and sharp image.

Additional broadband anti-reflective multi-coating reduces internal reflections and ensures a high image contrast. FSND filters for IFM-1 are available in eight densities from ND 0.3 to ND 2.4 and can be purchased separately or in sets.

All benefits at a glance:

- Internal filtration reduces reflections, weight, hassle – and filter damage
- New high-tech filters based on white-water optical glass
- Internal filtration protects sensor
- Available in 8 densities from ND 0.3 to ND 2.4
- Neutral color balance at all densities through absorptive full spectrum ND coating
- High image sharpness through precision polishing
- High contrast through anti-reflective multi-coating
- IFM-1 filter holder is standard to all ALEXA XT models (except ALEXA XT Studio)
- IFM-1 upgrade is available for all ALEXA Classic models (except ALEXA Studio)

17.1.1 Safety instructions for in-camera filtration

Proper shimming is crucial for the safe use of in-camera filters. Only correct shimming ensures the proper flange focal depth.

17.1.1.1 Maximum lens mounting depth

Only cameras with the original IFM-1 Shim allow for 31.50 mm maximum lens mounting depth of PL mount lenses, when using in-camera filters.

To avoid damage or injury when using PL mount lenses, use only lenses that do not exceed the following dimensions:

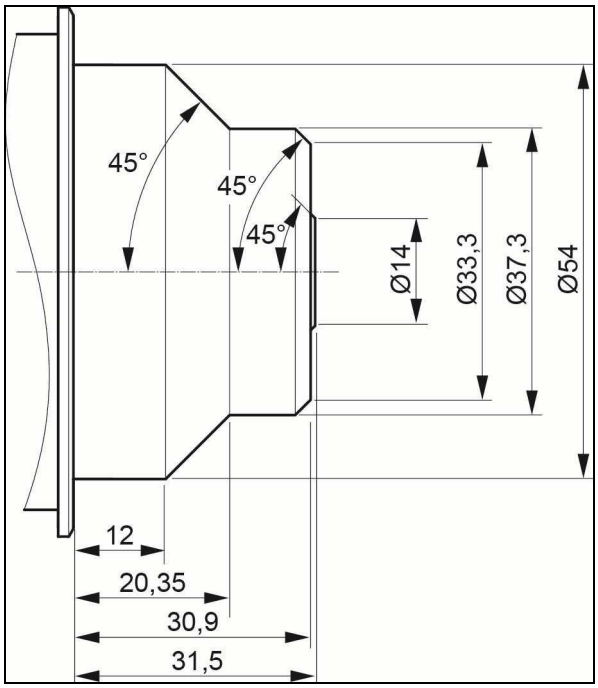


Figure 138: Allowed lens dimensions with in-camera filters

For a safe and correct use of internal filters, always shim your camera properly.

- Observe all precautions and use only proper tools, lenses and materials
- For PL mount lenses, use only lenses with 31.50 mm maximum mounting depth

CAUTION! Risk of damage and injury from improper lenses!

PL mount lenses with more than 31.50 mm mounting depth, might damage internal filters and the camera. Shards from broken filter glass might cause injury.

Always check the lens mounting depth before mounting or changing a lens.

CAUTION! Risk of damage and injury from insufficient shimming!

All internal filters require a properly shimmed lens mount. Otherwise, even PL mount lenses with a nominal mounting depth of less than 31.50 mm might damage internal filters and the camera. Shards from broken filter glass might cause injury.

To ensure maximum allowable lens mounting depth, and to avoid damage or injury, always shim your camera correctly (see Chapter *Shimming the lens mount* on page 222).

The proper IFM-1 Shim comes with all three FSND Filter Sets (Basic, Full or Completion), with the upgrade kit for ALEXA Classic cameras (Internal Filter Module (IFM-1) Set) and is also available individually. Use only this original shim when filtering with IFM-1.

CAUTION! Risk of damage from improper tools, materials or negligence!

In-camera filters are very delicate. Always handle them very carefully and with proper tools (e.g. the original Ground Glass/Frameglow tool). Never touch the filter glass with bare fingers (sweat and physical contact might damage the sensitive coating).

Check and clean each filter before and after use. Store it properly. Use only original ARRI cleansing utensils and materials (others might damage the filter).

17.1.1.2 Basic precautions

When using IFM-1 and internal filters:

1. Have the correct IFM-1 Starter Kit available
2. Ensure a clean, dust-and-moisture-free environment
3. Wear fresh rubber gloves to avoid fingerprints and smear
4. Place the camera on a flat, level and safe surface
5. Never touch the sensor
6. Work very carefully due to the delicate nature of tools/components
7. Safely store all tools/components afterwards
8. Shim you camera exactly to required flange focal depth
9. Check each lens mounting depth and flange shape
10. Use only lenses within allowed dimensions

17.1.1.3 Required shimming and maximum lens mounting depth

Only proper shimming will ensure the maximum allowable lens mounting depth (see Chapter *Maximum lens mounting depth* on page 214):

- For safe use of in-camera filters, always prepare your camera with the original IFM-1 Shim
- See Chapter *Shimming the lens mount* on page 222

17.1.1.4 Available IFM-1 and FSND Filter Sets

IFM-1 equipment enables in-camera filtration for both ALEXA XT and ALEXA Classic cameras (except ALEXA Studio and ALEXA XT Studio). Four different sets are available:

1. Internal Filter Module (IFM-1) Set: Upgrade set for ALEXA, ALEXA Plus, ALEXA Plus 4:3 and ALEXA M, includes the FSND Filter Set (Basic)
2. FSND Filter Set (Basic): Basic set of filters and tools, suitable for all ALEXA XT models, except ALEXA XT Studio
3. FSND Filter Set (Completion): Complementary set of filters
4. FSND Filter Set (Full): Complete set of filters and tools, suitable for ALEXA XT

The minimum requirement for using internal filters is either set 1 or set 2, which offer a range of basic in-camera filters and allow proper preparation of the camera.

The FSND Filter Set (Completion) adds all remaining FSND filters and is suitable for both ALEXA Classic and ALEXA XT models.

The FSND Filter Set (Full) offers the whole range of FSND filters and is only suitable for ALEXA XT models.

17.1.2 Preparing Internal Filtration

All ALEXA XT models (except ALEXA XT Studio) have a pre-installed IFM-1 Bottom Ring and IFM-1 Reflex Tube. For ALEXA Classic cameras, both components are part of the IFM-1 Set.

ALEXA XT models come with an additional IFM-1 Empty Filter Frame. This glassless filter ring serves as a placeholder for in-camera filters and is not needed by ALEXA Classic cameras.

Therefore, preparing an ALEXA XT for internal filtration differs slightly but crucially from preparing an ALEXA Classic (see Chapter *Shimming the lens mount* on page 222).

17.1.2.1 FSND Filter Set (Basic) for ALEXA XT

The FSND Filter Set (Basic) for ALEXA XT models (except ALEXA XT Studio) contains all components and filters essential for in-camera ND filtering:

- Storage Case
- IFM Optical Clear (1) ND 0.0
- Ground Glass/Frameglow tool (2)
- IFM Shim (3)
- Microfiber Cloth (4)
- 3 Internal Filters (5) FSND 0.6, 1.2, 1.8
- Cleaning Instructions

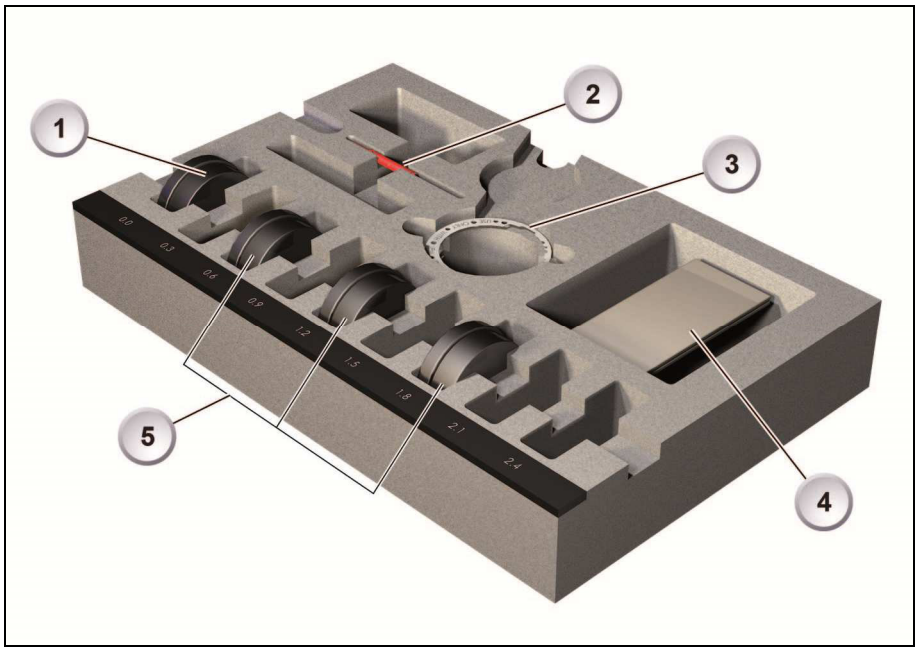


Figure 139: The FSND Filter Set (Basic) for ALEXA XT

17.1.2.2 IFM-1 Set for ALEXA Classic

The IFM-1 set for ALEXA Classic models (except ALEXA Studio) is almost identical to that for ALEXA XT models. It additionally contains a special IFM-1 wrench, and also some IFM-1 components that are pre-installed in ALEXA XT models (marked by asterisk*):

- Storage Case
- IFM Optical Clear (1) ND 0.0
- IFM-1 Wrench (2)*
- IFM-1 Reflex Tube (3)*
- IFM-1 Bottom Ring (4)*; locks internal filters magnetically
- Ground Glass/Frameglow tool (5)
- IFM Shim (6)

- Microfiber Cloth (7)
- 3 Internal Filters (8) FSND 0.6, 1.2, 1.8
- Cleaning Instructions

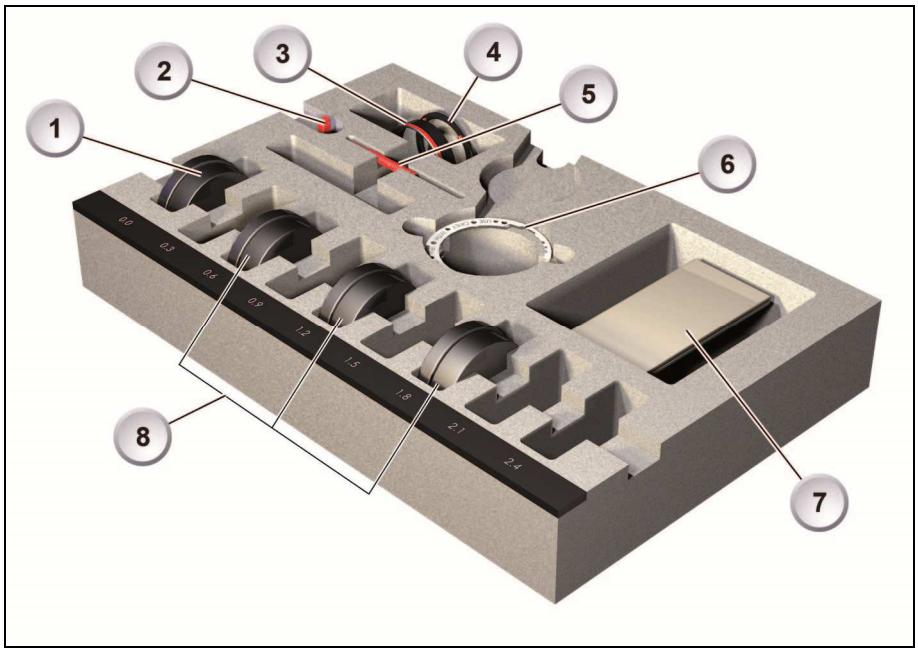
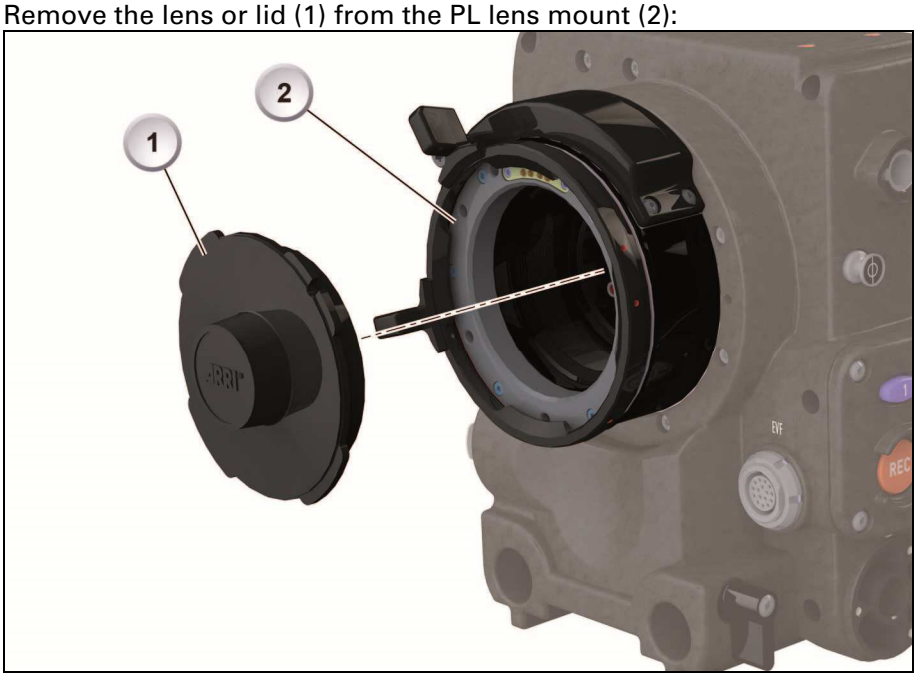


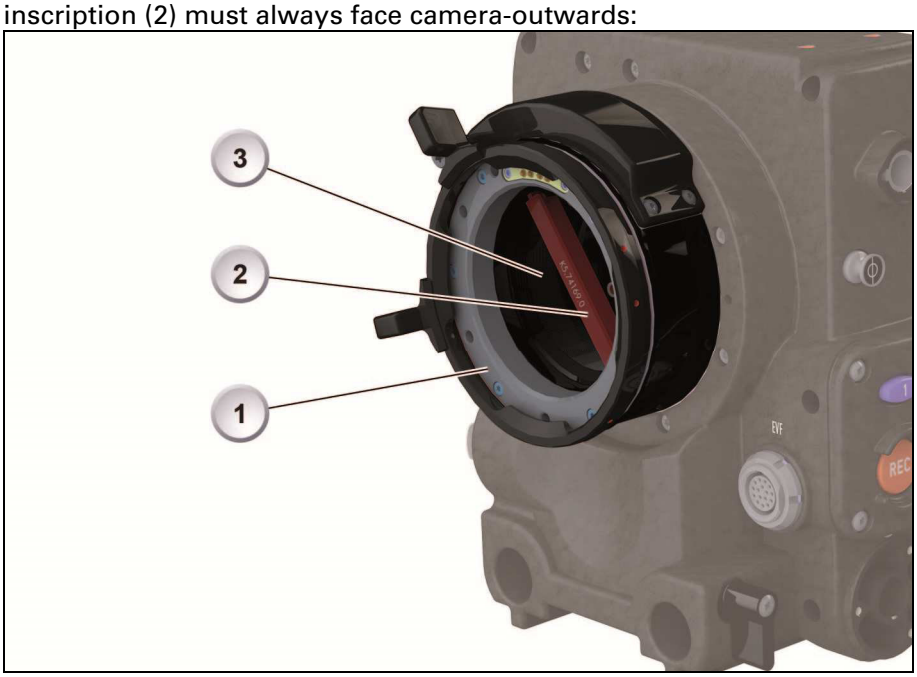
Figure 140: The IFM-1 Set for ALEXA Classic

To prepare your ALEXA Classic (except Studio) for IFM-1:

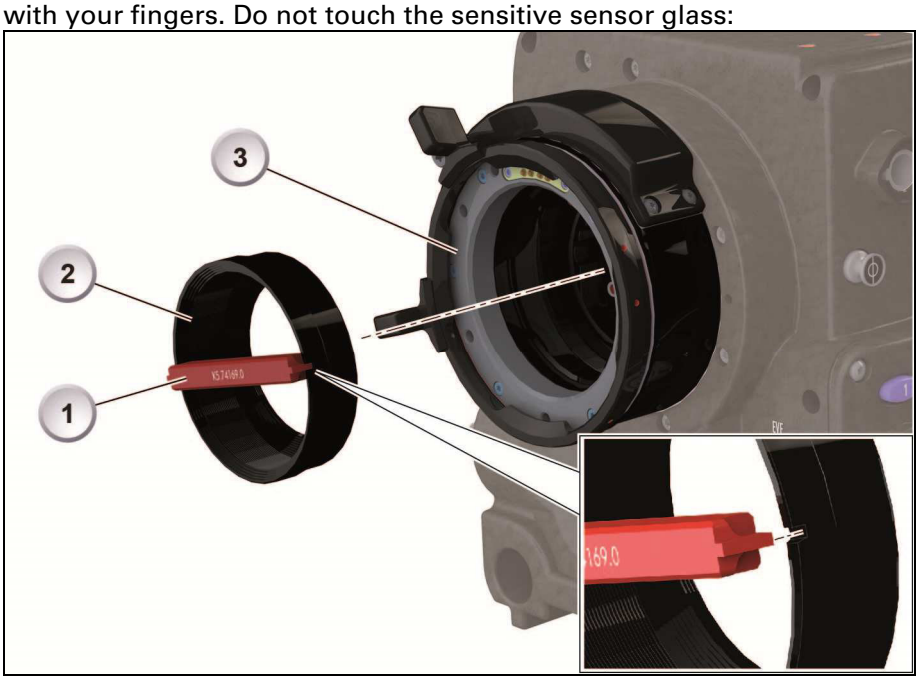
1. Remove the lens or lid (1) from the PL lens mount (2):



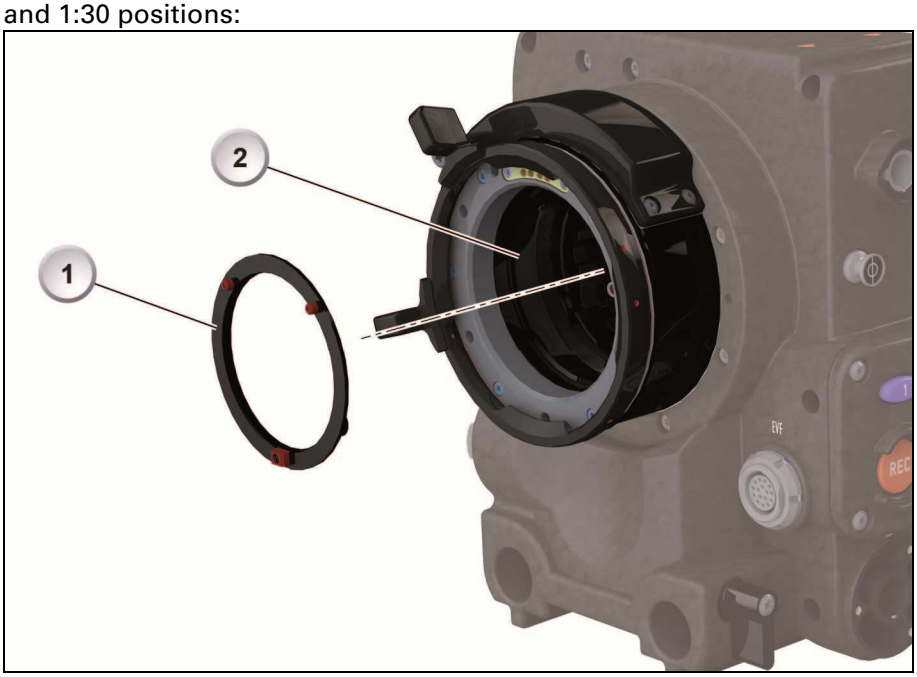
2. Place the two longer noses of the IFM-1 Wrench (2) into the notches of the existing reflex tube (3) in the PL mount (1). The wrench inscription (2) must always face camera-outwards:



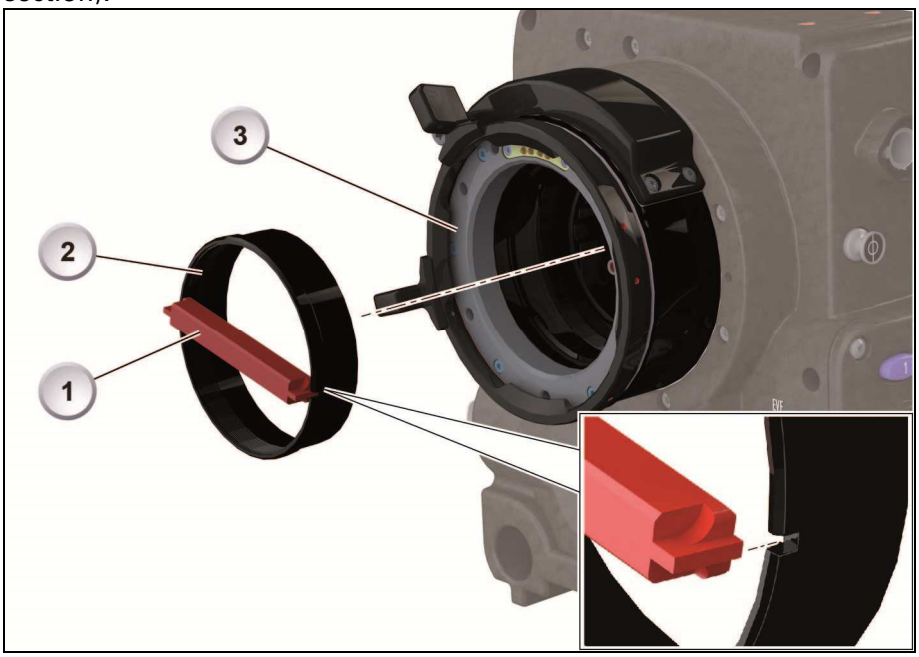
3. Untighten the reflex tube (2) with the wrench (1) and unscrew it with your fingers. Do not touch the sensitive sensor glass:



4. Accurately insert the IFM-1 Bottom Ring (1) into the PL mount (2). The square red nut must be in the 6 o'clock position and face camera-outwards, with the two smaller red pins taking the 10:30 and 1:30 positions:



5. Screw the IFM-1 Reflex Tube into the PL mount, using your fingers. Do not touch the delicate sensor glass
6. Tighten the IFM-1 Reflex Tube with the two shorter noses (1) of the wrench (1), with its inscription facing camera-inwards (see detailed section):



7. Insert the IFM Shim (see next chapter)

CAUTION! Risk of damage and injury from insufficient distance between lens contact face and Bottom Ring!

The distance between lens contact face and Bottom Ring must be at least 27.5 mm with an unshimmed PL mount, or 27.68 mm with a shimmed PL mount respectively, to prevent collision of filter and lens. Otherwise, even PL mount lenses with a nominal mounting depth of equal or less than 31.50 mm might damage internal filters and the camera. Shards from broken filter glass might cause injury.

17.1.3 Shimming the lens mount

In-camera filtration will change your flange focal depth. Therefore, all internal filters require a properly shimmed lens mount (see Chapter *Safety instructions for in-camera filtration* on page 214).

Note: Use only the original shim IFM Shim when filtering with IFM-1.

To compensate for the change in flange focal depth due to the shim, always insert the IFM Optical Clear filter when no filtering is needed.

When the camera is no longer shimmed for IFM-1, the glassless IFM Empty Filter Frame must be placed back into the filter position.

General shimming precautions:

- Fix the IFM Shim properly between lens lock and lens mount
- The shim's inscription must face camera-outwards
- Mount all proper shims correctly without omitting, adding or losing any. Otherwise, the flange focal depth will not be correct.
- Mark your cameras shimmed for IFM-1 to avoid confusion

Specific ALEXA XT shimming (and de-shimming) precautions:

Once ALEXA XT is shimmed for IFM-1: Immediately replace the IFM Empty Filter Frame with an FSND filter or the IFM Optical Clear filter.

Store the IFM Empty Filter Frame in a safe place: When the ALEXA XT is no longer shimmed for IFM-1 in the future, the IFM Empty Filter Frame must be placed back into the filter position.

If you de-shim ALEXA XT: Immediately replace the IFM Optical Clear filter or any other FSND filter with the IFM Empty Filter Frame (see Chapter *Preparing Internal Filtration* on page 217)

To compensate for the change in flange focal depth due to the shim:

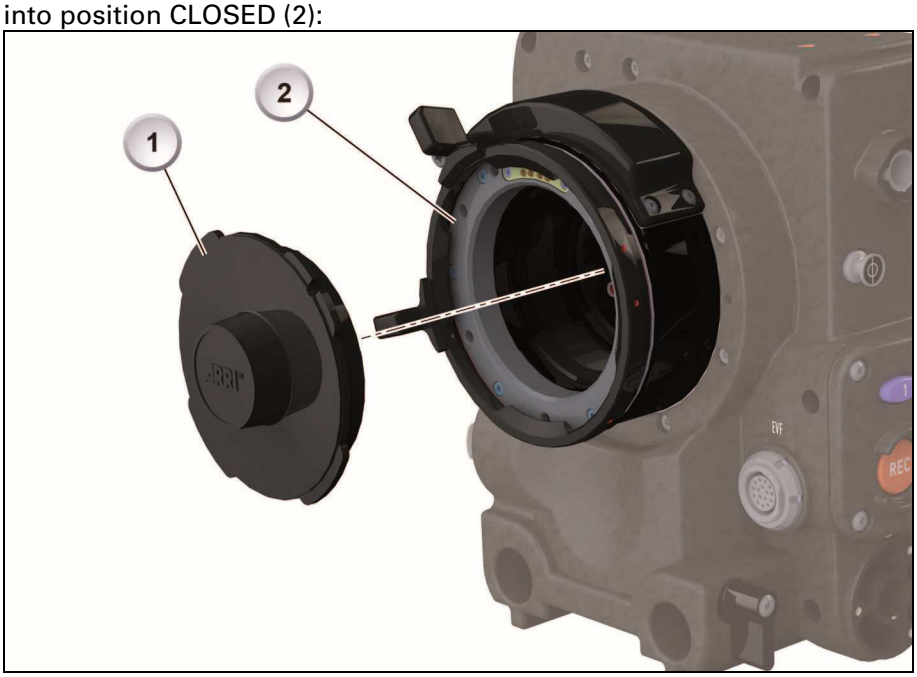
- Always use the IFM Optical Clear filter when no filtering is needed
- See Chapter *Preparing Internal Filtration* on page 217 for details on IFM Empty Filter Frame and differences between ALEXA XT and ALEXA Classic

Tools needed:

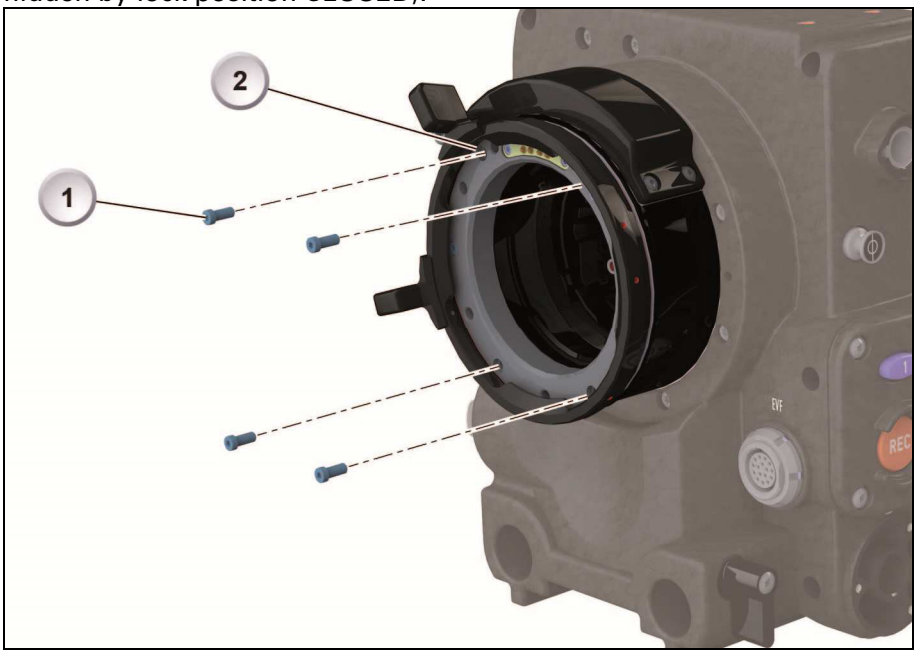
- TX6 torx screwdriver

To shim the mount:

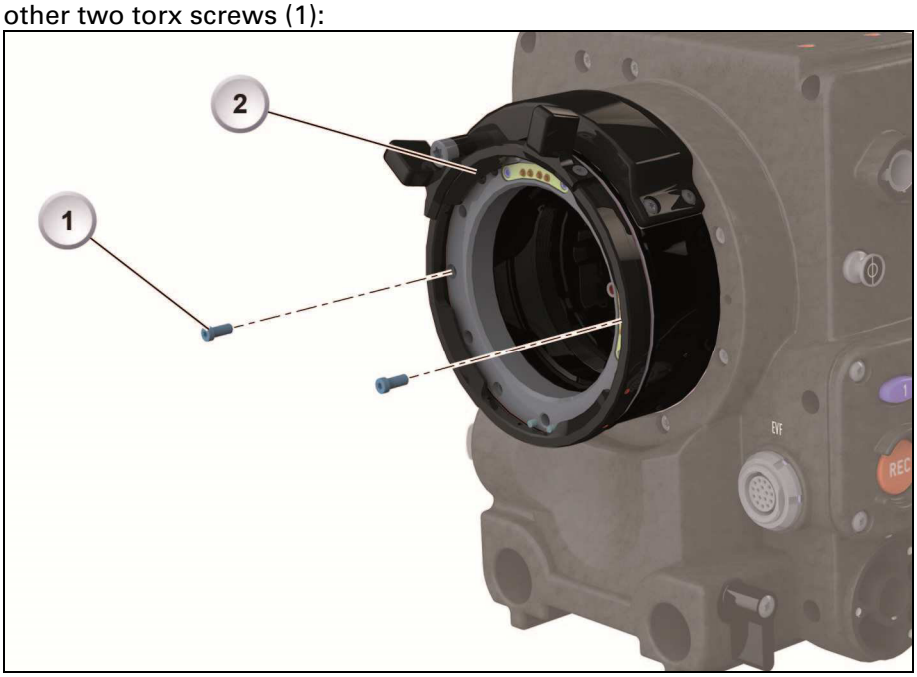
1. Remove lens or lid (1) from the PL lens mount and turn the lens lock into position CLOSED (2):



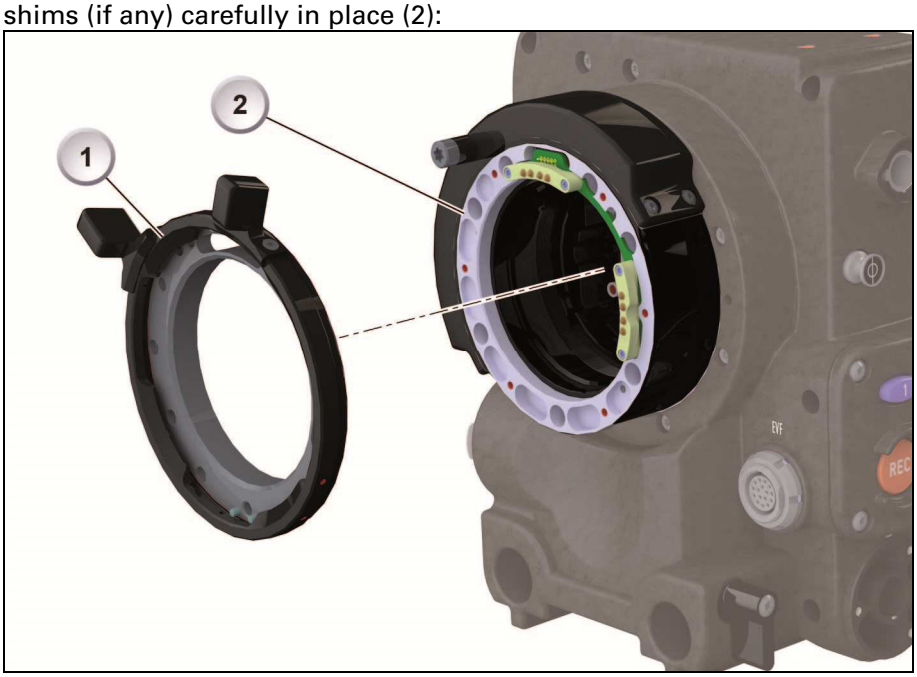
2. Unscrew (only with a TX6 torx screwdriver!) the four accessible torx screws (1) that hold the lens lock (the other two torx screws are still hidden by lock position CLOSED):



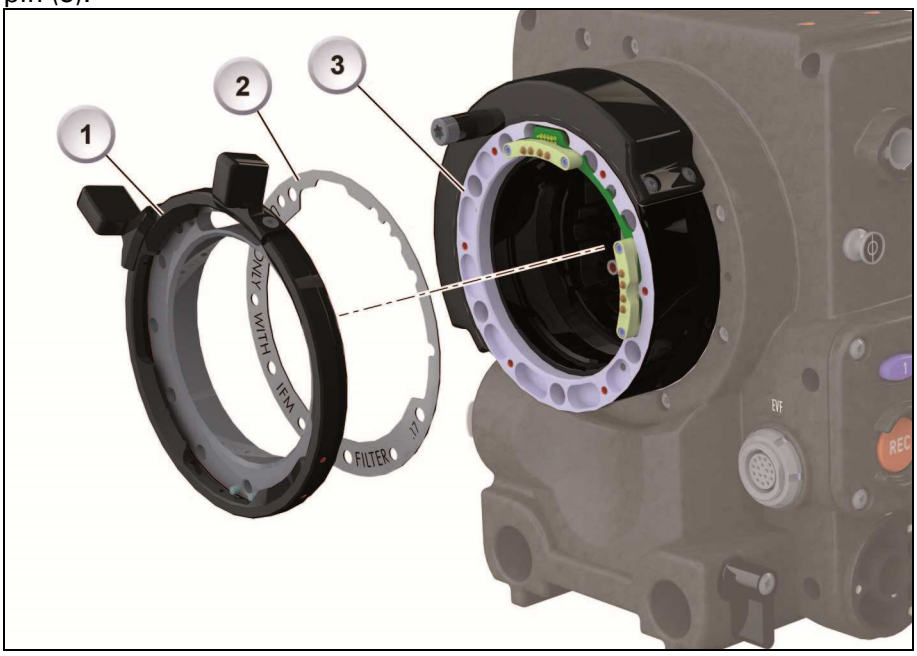
3. Turn the lens lock into position OPEN (2) to unhide and unscrew the other two torx screws (1):



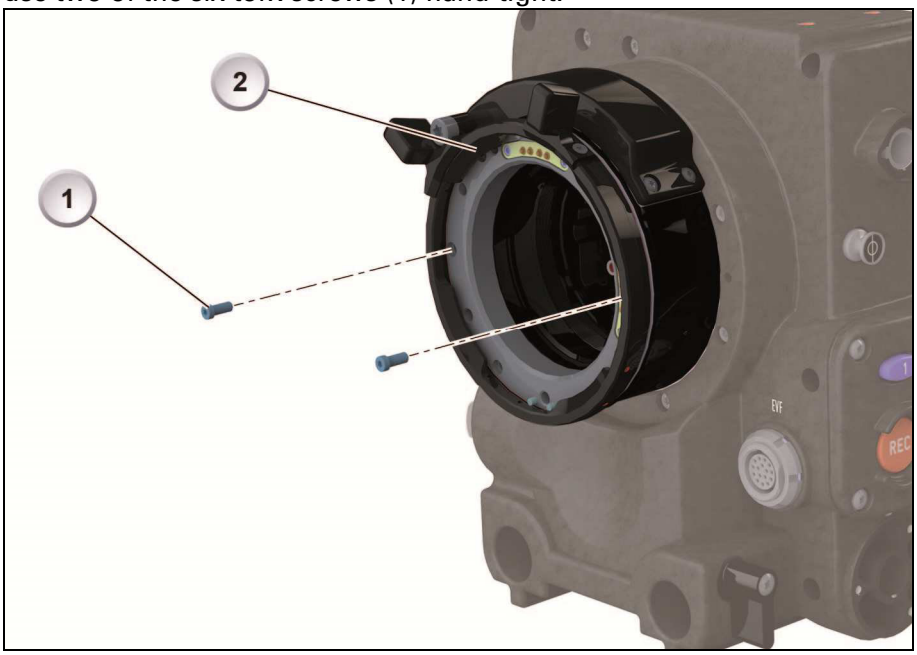
4. Remove the lens lock (1) from the PL mount. Keep all installed shims (if any) carefully in place (2):



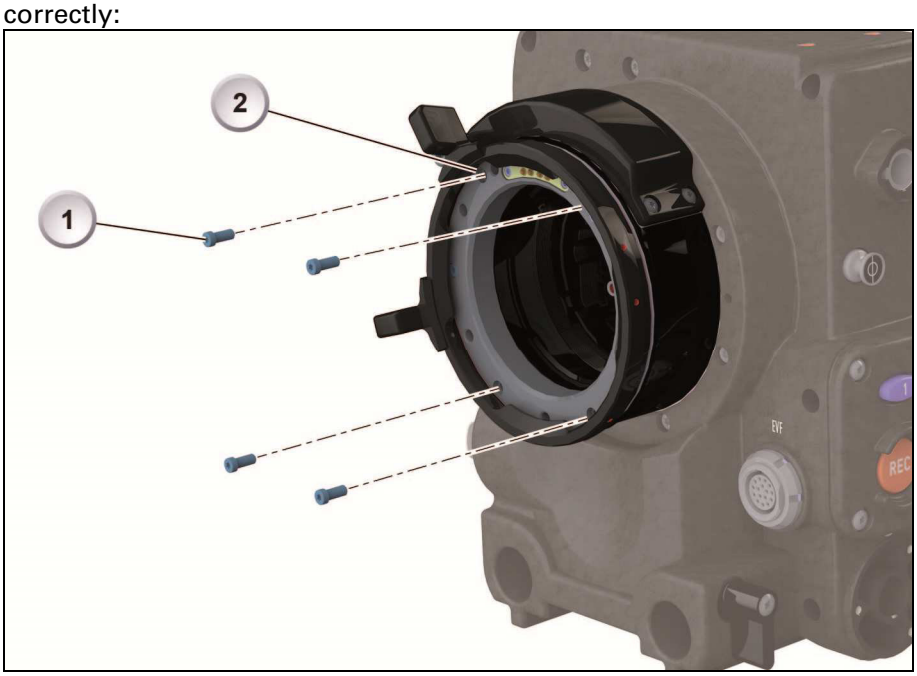
5. Accurately place the IFM Shim, with its inscription always facing camera-outwards (2), onto the PL mount. The shim's screw holes must line up exactly with the mount's thread holes and the index pin (3):



6. Fasten the lens lock, still in position OPEN (2), back to the PL mount; use two of the six torx screws (1) hand-tight:



7. Turn the lens lock into Position CLOSED (2) and fasten the other four torx screws hand-tight (1). Check if all screws and the shim fit correctly:



8. Before mounting a lens, always check its mounting depth (see Chapters *Safety instructions for in-camera filtration* on page 214 and *Maximum lens mounting depth* on page 214)

17.1.4 Mounting in-camera filters

Internal filters are very delicate. Before you mount or change a filter, check the lens mounting depth (see Chapters *Safety instructions for in-camera filtration* on page 214 and *Maximum lens mounting depth* on page 214).

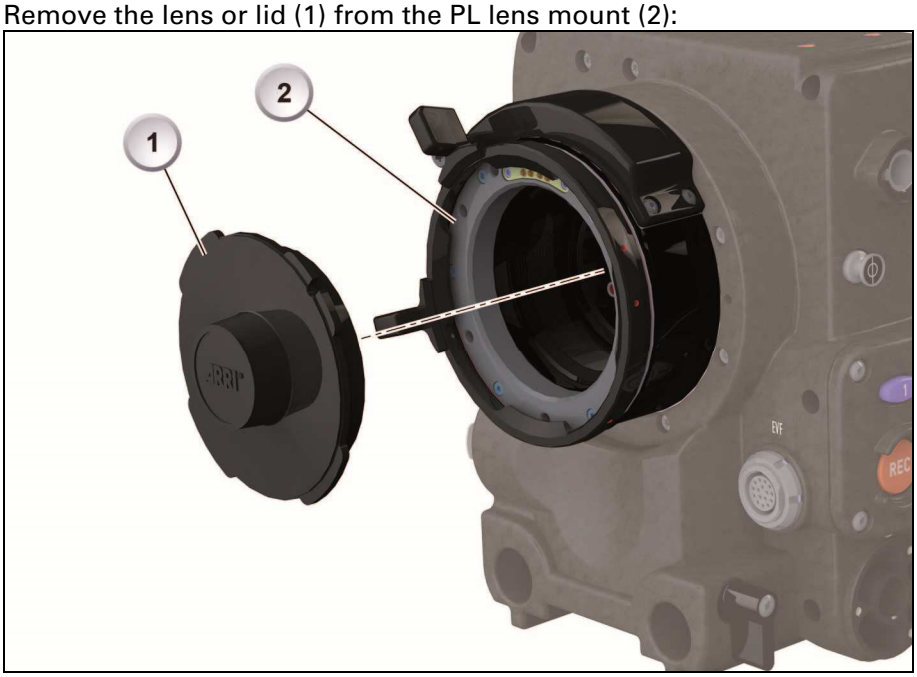
Note: By default, the filter position in the lens mount of the ALEXA XT (except ALEXA XT Studio) is occupied by the IFM Empty Filter Frame. This glassless filter ring must be replaced by a real filter or IFM Optical Clear filter, once the camera is shimmed for IFM-1 use (see Chapter *Shimming the lens mount* on page 222)

Tools needed:

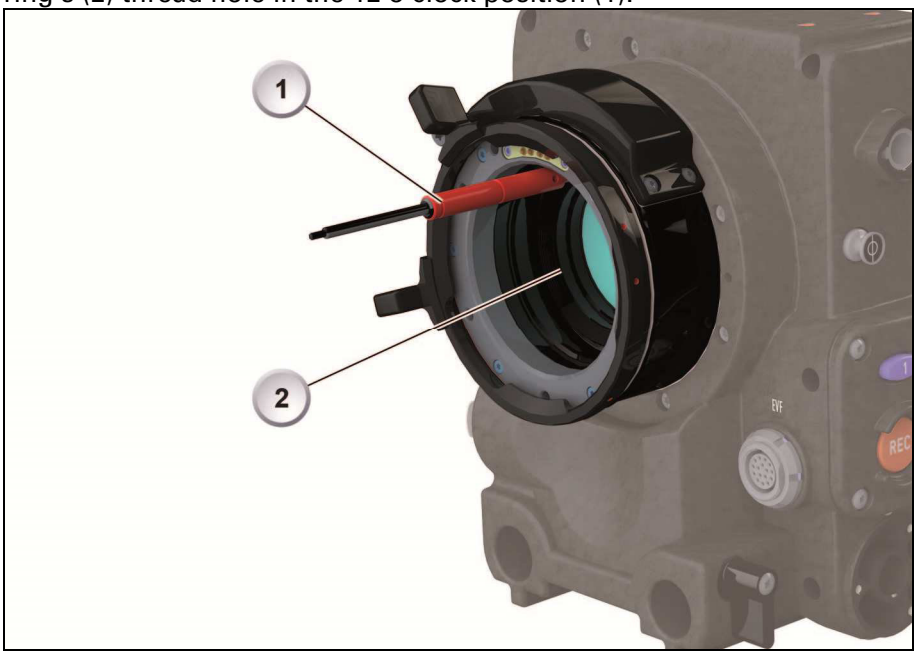
- Ground Glass/Frameglow tool

To insert or change an in-camera filter:

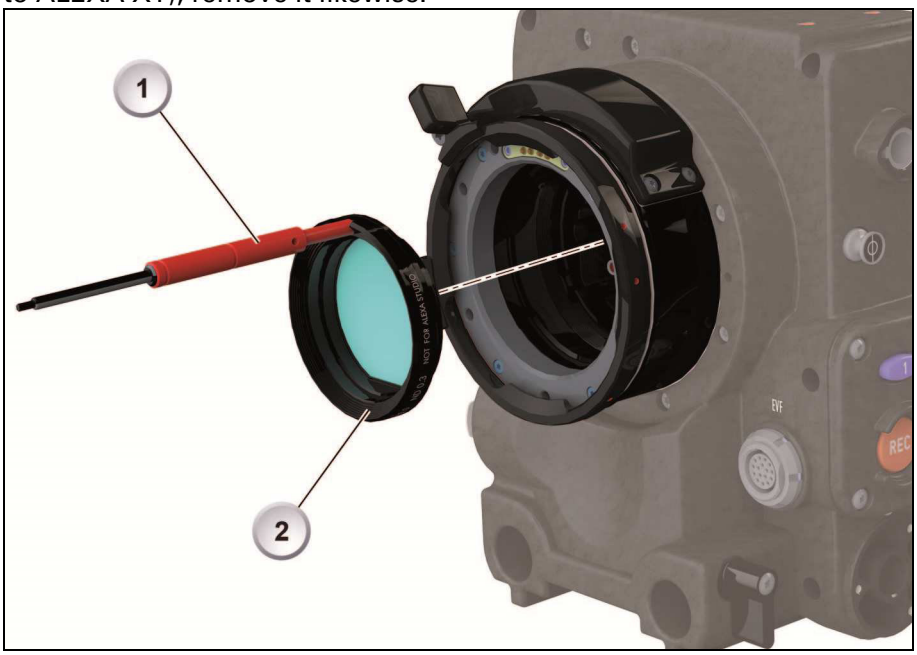
1. Remove the lens or lid (1) from the PL lens mount (2):



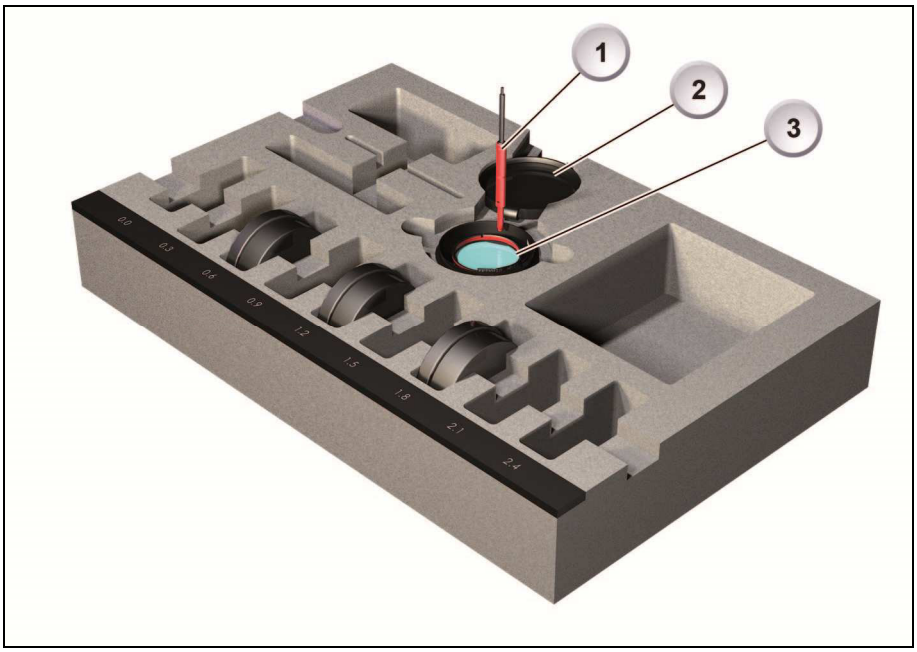
2. Carefully screw the Ground Glass/Frameglow tool (1) into the filter ring's (2) thread hole in the 12 o'clock position (1):



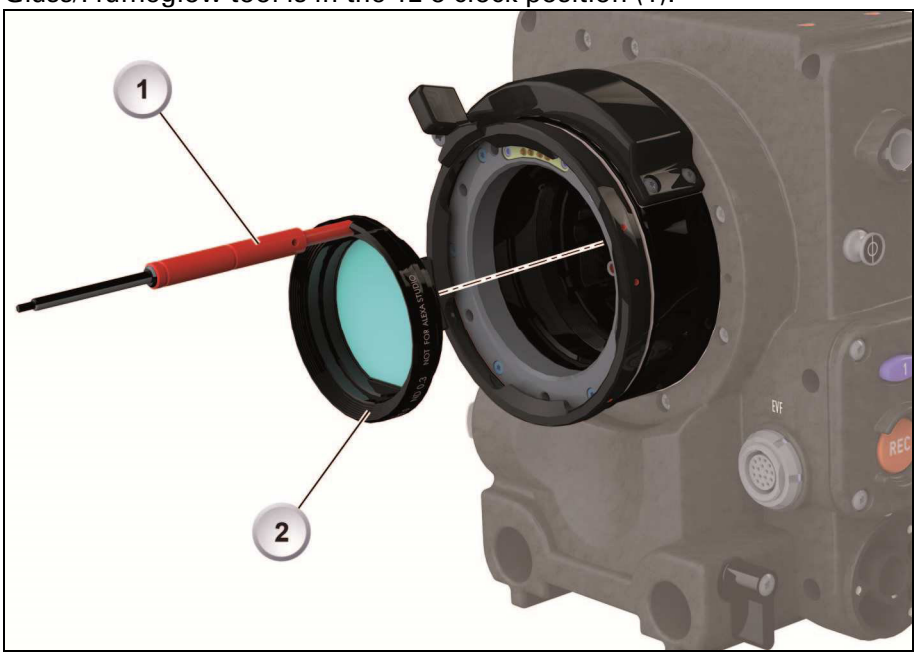
3. Pull the filter (2) from the bottom ring in the camera's PL mount. If the filter position is held by an IFM Empty Filter Frame (applies only to ALEXA XT), remove it likewise:



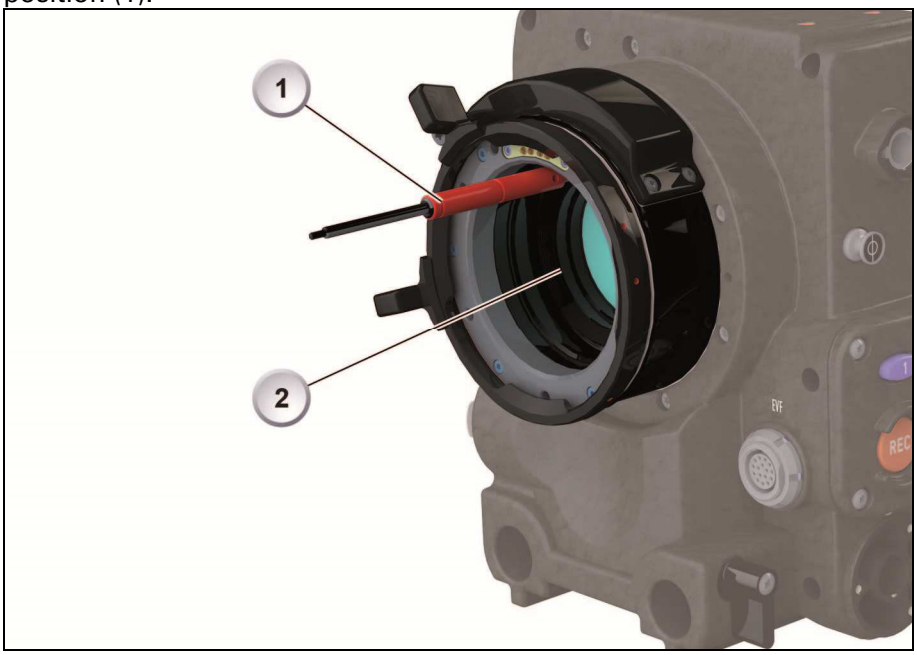
4. Clean the removed filter and stow it properly in its individual box and the storage case. If the filter position was held by an IFM Empty Filter Frame, store it likewise (in case the camera is no longer shimmed for IFM-1 in the future)
5. Place the removed filter into its padded filter box (2) in the storage case (3). Remove the Ground Glass/Frameglow tool (1) to pick up the next filter:



6. Make sure the next filter is clean (2) and the Ground Glass/Frameglow tool is in the 12 o'clock position (1):



7. Place the next filter onto the bottom ring in the camera's PL mount. The Ground Glass/Frameglow tool has to be in the 12 o'clock position (1):



8. Align the filter ring's main notch with the bottom ring's red nut in the 6 o'clock position. To ensure an accurate fit, align the filter ring's other notches with the two red noses in the bottom ring's 10:30 and 1:30 positions
9. After the magnetic filter ring has audibly snapped into position, carefully unscrew the Ground Glass/Frameglow tool. The filter has to sit precisely on the bottom ring
10. Mount a lens (observe maximum lens dimensions!), or cover the PL lens mount properly with its lid (1).

Note: All internal filters require a properly shimmed lens mount (see Chapter *Shimming the lens mount* on page 222).

To compensate for the change in flange focal depth due to the shim, always insert the IFM Optical Clear filter when no filtering is needed.

When the camera is no longer shimmed for IFM-1, the glassless IFM Empty Filter Frame must be placed back into the filter position.

Note: Internal filtration does not work with ALEXA Studio and ALEXA Studio XT. For PL mount lenses, IFM-1 works only with a lens mounting depth of 31.50 mm maximum.

17.1.5 Filter cleansing

Tools needed:

- Cleaning Instructions
- Fresh rubber gloves
- Micro bellows

- Cotton swab
- Purified alcohol
- Microfiber Cloth from IFM-1 Starter Kit

To clean the filters:

Note: To avoid in-camera damage, always clean all filters outside of camera.

1. Ensure a clean, dust-and-moisture-free environment
2. Wear fresh rubber gloves to avoid fingerprints and smear
3. Never touch the sensor
4. Check the coating for dirt, smear and scratches
5. Remove sand, dust or solid particles with micro bellows
6. Clean off oil, grease or smear with a cotton swab (or the microfiber cloth) slightly wetted in purified alcohol only

17.1.6 FSND Filter Set (Completion)

The FSND Filter Set (Completion) for both ALEXA XT and ALEXA Classic models (except ALEXA XT Studio and ALEXA Studio) is a useful completion. It offers:

- 5 Internal Filters FSND 0.3, 0.9, 1.5, 2.1, 2.4

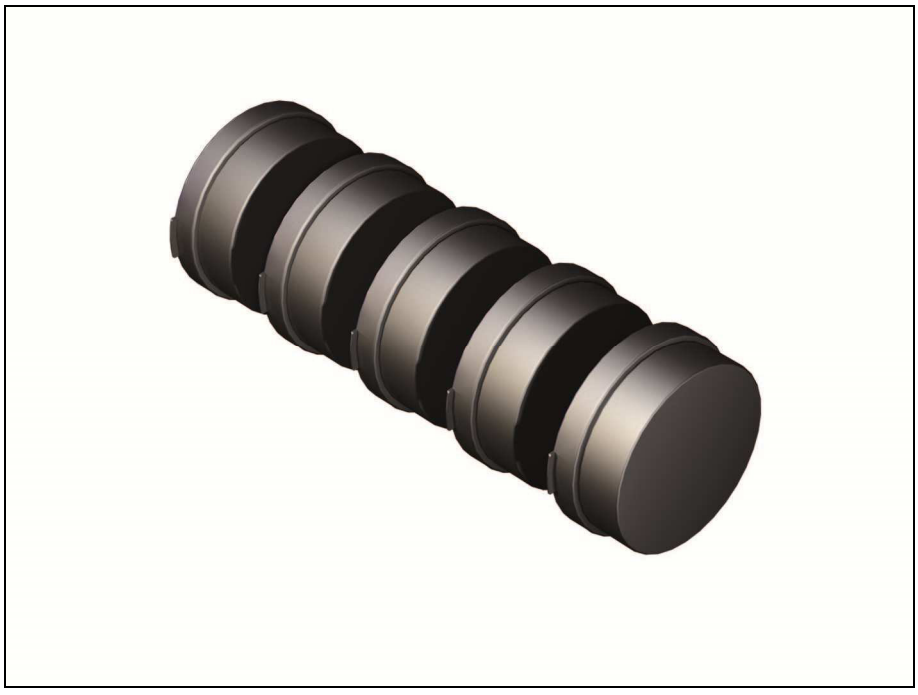


Figure 141: Each filter of the FSND Filter Set (Completion) comes in a practical individual box and is also available separately

To insert or change a filter:

See Chapter *Mounting in-camera filters* on page 227. Each filter is also available separately or in bundles.

17.1.7 FSND Filter Set (Full) for ALEXA XT

The FSND Filter Set (Full) for ALEXA XT is a set with all FSND filters and required tools, which requires a pre-installed IFM-1. It consists of:

- Storage Case
- IFM Optical Clear (1) ND 0.0
- Ground Glass/Frameglow tool (2)
- IFM Shim (3)
- Microfiber Cloth (4)
- 8 Internal Filters (5) FSND 0.3, 0.6, 0.9 1.2, 1.5, 1.8, 2.1, 2.4
- Cleaning Instructions

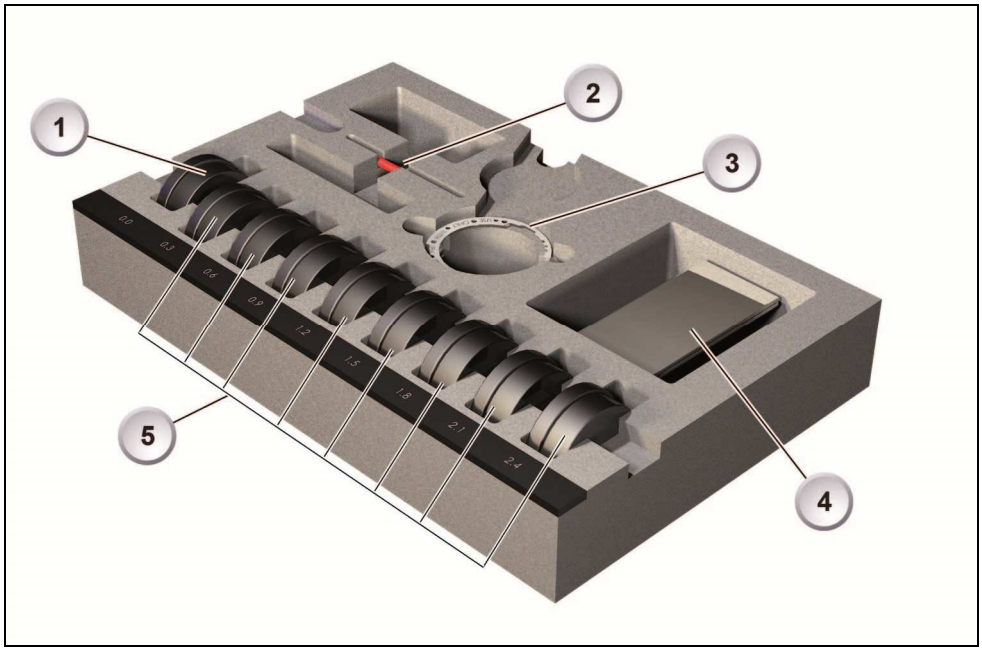


Figure 142: The FSND Filter Set (Full) for ALEXA XT

For proper use and safety instructions, see Chapter *In-Camera Filter Module IFM-1* on page 213.

18 ALEXA Fiber Remote Option

The ALEXA Fiber Remote Option is bringing the pristine and unrivaled image quality of the ALEXA camera into a multi-camera environment typical of broadcast studio or OB van productions. With the Fiber Remote Option attached, the ALEXA is connected through a SMPTE 311M fiber connection and can be remote controlled for live painting operation.

For more information about the ALEXA Fiber Remote Option, please refer to its manual or visit http://www.arri.com/camera/digital_cameras.

19 Remote Control Unit RCU-4

The camera can be remote controlled with an RCU-4. This device mirrors the controls on the camera's right side. It is connected to the camera's Ethernet port. Power is supplied via the Ethernet cable.

Note: The ALEXA M features two ports labeled "ETH" in addition to the Ethernet port. However, these cannot be used for connecting the RCU-4.

To power the RCU-4, press the power button after connecting the device to a camera.

During boot-up, the RCU-4 compares its firmware version with the camera firmware version. If it detects a difference, it will update itself to match the camera's firmware version. When the update is completed, the RCU-4 will shut down automatically.

The power button of the RCU-4 only affects the RCU-4. It is not possible to power or to shut down the camera with the RCU-4. When the camera is powered down, the RCU-4 shuts down automatically as it loses its power supply.

The LOCK button of the RCU-4 locks only the RCU-4. It does not affect the camera lock.

For more info, please refer to the RCU-4 user manual.

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A.1 Appendix

ALEXA EV

Image Sensor

Type	ALEV III CMOS sensor
Sensor frame rates	0.750 - 60.000 fps 60.000 - 120.000 fps in High Speed mode
Shutter angle	5.0° - 358.0° 5.0° - 356.0° in High Speed mode
Total active photo sites (incl. surround view)	3168 x 1782 (16:9) 3168 x 2160 (4:3)
Photo sites of recorded image	2880 x 1620 (16:9) 2880 x 2160 (4:3)
Aperture of recorded image	23.76 x 13.365 mm (16:9) 23.76 x 17.82 mm (4:3)
Image aperture (incl. surround view)	26.14 x 14.70 mm (16:9) 26.14 x 17.82 mm (4:3)
Photo site pitch	8.25 µm
Aspect ratios	1.78:1 (16:9) 1.33:1 (4:3)
Filters	optical low pass, UV, IR
Color filters	RGB primary colors

Lens

Lens mount	Exchangeable lens mount, with PL mount LA-PL-1 installed
Flange focal depth	52.00 mm nominal

Image processing

White balance	2000 - 11000 Kelvin
CC Shift	-8 to +8 (translates to full magenta/ full green gel correction)
EI rating	160 - 3200 ASA
Recorded image resolutions	1920 x 1080 pixels (16:9 HD) 2048 x 1152 pixels (16:9 2K) 2880 x 1620 pixels (16:9 ARRIRAW) 2048 x 1536 pixels (4:3 2K) 2880 x 2160 pixels (4:3 ARRIRAW)

Viewfinder

Type	ARRI EVF-1
Technology	LCOS imaging device
Resolution	1280 x 784 pixels

Power

Power supply	DC 11 - 34V
Power management	Active ORing between BAT connector and onboard battery adapters
Power consumption	ca. 85W w/o accessories
Power outputs	2 x RS (24V), 1x 12V

Recording

Recording media	Sony **SxS PRO** cards XR Capture Drives
Recording compression codec	Apple ProRes 422/4444 codec family Avid DNxHD (requires license key, for ALEXAs with XR module available again in a later SUP version) ARRIRAW
Frame rates	0.75 - 60 fps 60 - 120 fps in High Speed mode

Image Outputs

Recording output	2x REC OUT configurable as: 2x 422 1.5G SL YCbCr @ frame rates: 23.976, 24, 25, 29.97 and 30 fps or 1x 422 1.5G DL YCbCr @ frame rates: 48, 50, 59.94 and 60 fps or 2x 422 3G SL YCbCr @ frame rates: 48, 50, 59.94 and 60 fps or 1x 444 1.5G DL RGB @ frame rates: 23.976, 24, 25, 29.97 and 30 fps or 2x 444 3G SL RGB @ frame rates: 23.976, 24, 25, 29.97 and 30 fps or 1x 444 3G DL RGB @ frame rates: 48, 50, 59.94 and 60 fps
Monitoring outputs	EVF out: proprietary signal for EVF-1 with delay <1 frame 1x MON OUT: 1x 422 1.5G @ frame rates: 23.976, 24, 25, 29.97 and 30 fps

Timecode

Type	TC clock generator with crystal oscillator
TC input	LTC in
TC outputs	LTC out HD-SDI LTC/VITC out

Dimensions and weight	
Length x Width x Height (body with SxS module)	332 x 153 x 158 mm 12.95" x 6.02" x 6.22"
Length x Width x Height (body with XR module)	332 x 161.6 x 158 mm 12.95" x 6.34" x 6.22"
Camera body weight with SxS module	6.3 kg / 13.8 lb
Camera setup weight with SxS module (incl. EVF-1, VMB-1, CCH-1)	7.7 kg / 16.9 lb
Camera body weight with XR module	6.6 kg / 14.5 lb
Camera setup weight with XR module (incl. EVF-1, VMB-1, CCH-1)	8.0 kg / 17.6 lb
Others	
SD card	most SD cards with FAT/FAT32 up to 4 GB
Sound level	under 20 dB(A) @ 24 fps and ambient temperature < 25° C / 77° F
Environmental	-20° C to +45° C @ 95% relative humidity max, non condensing

The following table lists the differences of specific ALEXA models compared to a standard ALEXA:

ALEXA Plus (4:3)	
Length x Width x Height (body with SxS module)	332 x 175 x 158 mm 12.95" x 6.89" x 6.22"
Length x Width x Height (body with XR module)	332 x 184.6 x 158 mm 12.95" x 7.24" x 6.22"
Camera body weight with SxS module	7.0 kg / 15.4 lb
Camera setup weight with SxS module (incl. EVF-1, VMB-1, CCH-1)	8.4 kg / 18.5 lb
Camera body weight with XR module	7.3 kg / 16.1 lb

Camera setup weight with XR module (incl. EVF-1, VMB-1, CCH-1)	8.7 kg / 19.2 lb
Lens mount	Exchangeable lens mount, with PL mount LA-PL-2 installed

ALEXA Studio

Length x Width x Height (body with SxS module)	363 x 177 x 163 mm 14.29" x 6.97" x 6.41"
Length x Width x Height (body with XR module)	363 x 183.6 x 163 mm 14.29" x 7.09" x 6.41"
Camera body weight with SxS module	8.0 kg / 17.6 lb
Camera setup weight with SxS module (incl. OVF, CCH-1)	10.2 kg / 22.5 lb
Camera body weight with XR module	8.3 kg / 18.3 lb
Camera setup weight with XR module (incl. OVF, CCH-1)	10.5 kg / 23.1 lb
Lens mount	Exchangeable lens mount, with PL mount LA-PL-2 installed
Sensor frame rates	0.750 - 60.000 fps 60.000 - 120.000 fps in High Speed mode 0.75 - 48.000 fps in 4:3 mode
Viewfinder	Optical viewfinder
Mirror shutter	Electronic mirror shutter
Shutter angle	5.0° - 358.0° 5.0° - 356.0° in High Speed mode 11.2° - 180.0° (Mirror shutter on)

ALEXA M

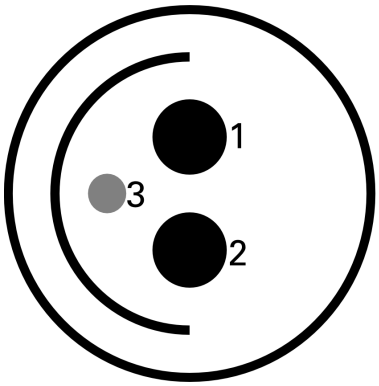
Length x Width x Height (M head)	212 x 129 x 149 mm 8.35" x 5.08" x 5.87"
M head weight	2.9 kg / 6.4 lb
Length x Width x Height (M backend, SxS module)	323 x 153 x 158 mm 12.72" x 6.02" x 6.22"
Length x Width x Height (M backend, XR module)	323 x 161 x 158 mm 12.72" x 6.34" x 6.22"

M backend weight with SxS module	5.5 kg / 12 lb
M backend weight with XR module	5.8 kg / 12.8 lb
Lens mount	Exchangeable lens mount, with PL mount LA-PL-2 installed
Sensor frame rates	0.750 - 60.000 fps 60.000 - 120.000 fps in High Speed mode 0.75 - 48.000 fps in 4:3 mode
Viewfinder	Electronic Viewfinder EVF-1

A.2 Connector Pin Outs

Note: The drawings of the connectors are not to scale.

BAT

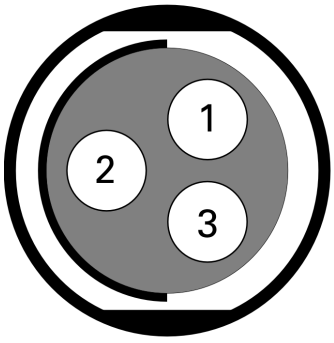


1 GND

2 +24V

3 BAT-COM

RS

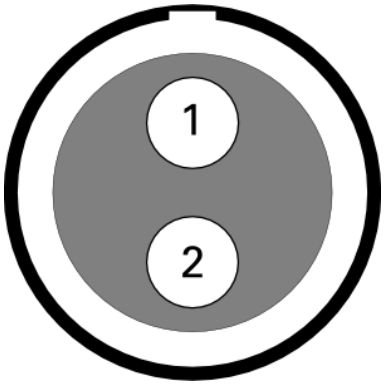


1 GND

2 24V-AUX

3 R/S

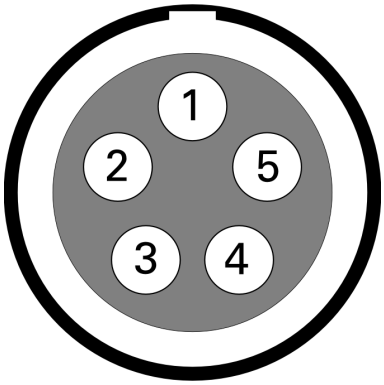
12V



1 GND

2 12V-AUX

TC



1 GND

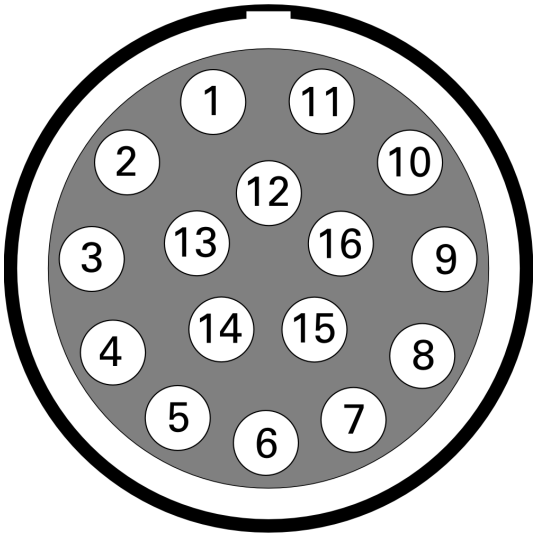
2 LTC IN

3 ASCII

4 TUNE OUT

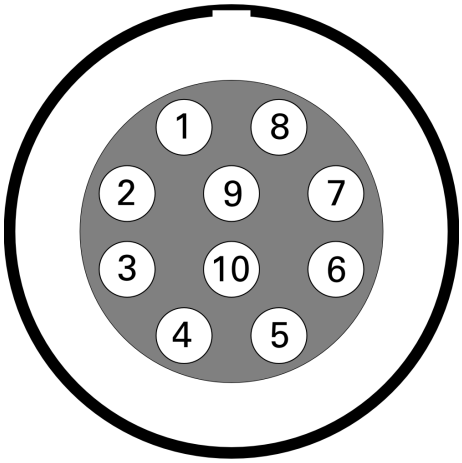
5 LTC OUT

EXT



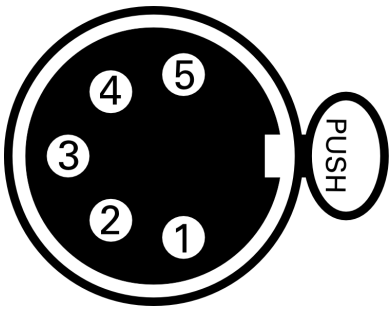
1	RS422-TXD(+)
2	RS232-TXD
3	CAN1-L
4	CAN1-H
5	CAN2-L
6	CAN2-H
7	24V-AUX
8	RS232-RXD
9	RS422-RXD(-)
10	RS422-RXD(+)
11	RS422-TXD(-)
12	GND
13	TTL-IN1
14	TTL-IN2
15	24V-AUX
16	GND

ETHERNET



1	MX-1P
2	MX-1N
3	MX-2P
4	MX-2N
5	MX-3P
6	MX-3N
7	MX-4P
8	MX-4N
9	GND
10	24V-ETH

AUDIO IN



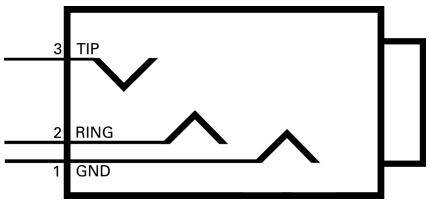
1	AGND
2	L-IN(+)

3 L-IN(-)

4 R-IN(+)

5 R-IN(-)

AUDIO OUT



1 GND

2 R-OUT

3 L-OUT

A.3 False Color Display

The false color display is a tool to check correct exposure. It can be activated in the EVF and the MON OUT image. When active, the image is turned into a greyscale image with important luminance ranges shown in signal colors. Note that the false color tool is only suitable for checking exposure and is not an appropriate tool for checking other image parameters or sensor quality.

Color Encoding

Six different colors are used to show the important luminance ranges.

What	Signal Level	Color
White clipping	100% - 99%	red
Just below white clipping	99% - 97%	Yellow
One stop over medium gray (Caucasian skin)	56% - 52%	pink
18% medium gray	42% - 38%	green
Just above black clipping	4.0% - 2.5%	blue
Black clipping	2.5% - 0.0%	purple

Figure 143: False Color Encoding

The following example illustrates the behavior of the false color display.

Figure 144: Night scene captured with ALEXA

Figure 145: Night scene with false color active

A.4 Warning and Error Messages

If anything unwanted occurs in the camera, it will give a message to the user.

These states, which require attention from the user, are indicated by icons in the main display, the viewfinder and the MON OUT.

Warnings inform the user that a state has changed or that an error is likely to occur, but recording is still possible.

When the camera goes into error state, recording is no longer possible, as it cannot be guaranteed that images are acquired as the user intended, or it is not possible for the camera to record.

The messages give a compact info of what has happened. If more information is required, please refer to the following tables.

Special warnings and errors: Sensor temperature

ALEXA has a Peltier element that keeps the image sensor at a stable temperature. This is important to achieve constant image quality. In certain situations the camera might not be able to keep the optimal temperature, or it might take some time to reach the optimal temperature. This may be the case directly after booting, or in very hot or cold environments.

A red temperature icon indicates that the sensor temperature is too far off to guarantee a high image quality. A white temperature icon indicates that the sensor temperature is not optimal, but image quality is still within the (very high) quality limits required by ARRI.

The related messages in the INFO screen are shown in the following tables.

ALEXA status message

System state: Good	Camera works properly.

ALEXA warning messages and meanings

Warning message	Meaning
Main Bat: Power warning	The battery attached to the BAT connector has reached its warning level. Battery power is about to end, and a replacement battery should be prepared.
Onboard Bat: Power warning	The battery attached to the onboard battery adapter has reached its warning level. Battery power is about to end, and a replacement battery should be prepared.
Card 1/2: Low capacity	The **SxS PRO** card in slot 1/2 has less than 3 minutes recording time left. Prepare a new card for recording.

Media: Low capacity	The recording medium has less than 3 minutes recording time left. Prepare a new card for recording.
Card 1/2: Rec inhibited	The **SxS PRO** card in slot 1/2 is protected. Remove the card from the camera, slide the switch located on the camera back end to the Rec enable position and re-insert the card.
Media: Rec. inhibited	The recording medium is protected. Remove the card from the camera, slide the switch located on the camera back end to the Rec enable position and re-insert the card.
Card 1/2: Full	The **SxS PRO** card in slot 1/2 is selected, but the **SxS PRO** card is full. Use a new card. Card in other slot can still record.
Media full	The recording medium is full.
Card 1/2: Wrong file system	The **SxS PRO** card in slot 1/2 is not formatted in the file system required by the camera. Format the card.
Media: Wrong file system	The recording medium is not formatted in the file system required by the camera. Format the medium.
Card 1/2: Card is too slow	The write speed of **SxS PRO** card in slot 1/2 is insufficient for the sensor fps set on the camera. Use a card with a higher write speed.
Media too slow	The write speed of recording medium is insufficient for the sensor fps set on the camera. Use a medium with a higher write speed.
Card 1/2: files not consistent	The metadata of one or more files on **SxS PRO** card in slot 1/2 are not consistent. Backup any data on the cards and format the card.
Media: files not consistent	The metadata of one or more files on the recording media are not consistent. Backup any data on the medium and format the medium.
Card 1/2: invalid card type	The card in slot 1/2 is not an **SxS PRO** card.
Media type not supported	The media type of the current medium is not supported.
Card 1/2: write problem	The camera has problems writing to the **SxS PRO** card in slot 1/2. Continue with a fresh card.
Media write problem	The camera has problems writing to the recording medium. Continue with a fresh medium.

Camera overheating	The camera system's temperature is reaching a critical level. This can either be due to a blocked camera fan or ambient temperature exceeding the system's limits. Apply additional cooling or switch off the camera to prevent hardware damage.
Low sensor temperature	The sensor temperature is lower than it should be. High image quality is still guaranteed.
High sensor temperature	The sensor temperature is higher than it should be. High image quality is still guaranteed.
Ext TC: Different frame rate	The external TC signal's time base differs from the project fps of the camera. Syncing is still possible.
Re-jam Timecode soon	Accuracy of jammed Timecode can soon expire. Re-jam camera with external Timecode soon.
Re-jam Timecode now	Accuracy of jammed Timecode has expired. Re-jam camera with external Timecode.
TC source forced to internal	Sensor fps does not match Project fps. External Free Run TC cannot be used, camera has switched to Int Rec Run TC.
TC mode forced to Rec Run	Sensor fps does not match Project fps. External Free Run TC cannot be used, camera has switched to Int Rec Run TC.
Interface bit error	Reboot camera. If error continues to occur, contact ARRI service.
Internal processing problem	Reboot camera. If error continues to occur, contact ARRI service.
Internal battery error	The internal battery which powers the real-time clock must be replaced. Contact an ARRI service center near you.
System problem	Reboot the camera. If error continues to occur, contact ARRI service.
System problem (I2C bus error)	Problem on camera data bus. Reboot the camera. If error continues to occur, contact ARRI service.
External TC: Incompatible frame rate	The external TC signal's time base is not accepted by the camera.
HD outs not synced. Trigger now!	Appears on slave cam with Ext sync activated, but not using settings sync. Send trigger from Ext sync master camera to ensure the REC OUTs of both cameras are in sync.
Connect with Ethernet slave!	Camera is set to Settings sync: Enet master, but is not connected with slave camera via Ethernet

Connect with Ethernet master!	Camera is set to Settings sync: Enet slave, but is not connected with master camera via Ethernet
External TC: Jamming. Please wait!	Camera jams to external TC signal. Do not disconnect TC source from camera until warning disappears.
External TC: Signal missing!	Camera is set to Ext LTC regen, but external TC signal is missing.
External TC: Incompatible frame rate!	The external TC signal has a time base that does not match the project fps of the camera.
Framegrab: Grabbing image failed	A problem occured in the camera. The frame grab failed.
Framegrab: Storing image failed	A problem occured with the SD card. The frame grab failed.
Playback failed	The camera could not play back the internally recorded clips.
EVF smooth mode not possible	Smooth mode is set to "On", but either sensor fps is higher then 30.000, or shutter angle is higher than 180.0
Ext LTC: Forced to JAM sync!	Ext LTC had to be switched to Jam sync by camera system.
Playback failed!	A problem with playback occured. Camera had to abort playback.
Card/Media removed, playback failed	Camera had to abort playback, as media was removed.
Calibrate lens motors!	New lens motors are attached to the camera. Prior to use they must be calibrated.
Temperature at limit. Fan RPM raised.	With camera fan is in "Rec low" mode, fan noise might exceed silent level because camera is becoming too hot.
Master/slave: Focus unit mismatch	With ALEXA Plus and 3D lens sync, both cameras must have same focus unit activated, which is not the case here.
Slave: No lens table active.	With ALEXA Plus and 3D lens sync, select lens table on slave when using LDA.
Tropical mode active	Reminder for active tropical mode
ND filter stuck.	ALEXA Studio only. ND filter slider has mechanical problems.
Mirror sector problem.	ALEXA Studio only. Mirror sector has mechanical problems.

Mirror cannot reach sync speed.	ALEXA Studio only. Mirror cannot reach speed due to technical problems.
Voltage too low for mirror!	ALEXA Studio only. Power supply voltage level insufficient to drive mirror shutter.
Mirror out of phase	ALEXA Studio only. Mirror shutter and sensor are out of phase, may result in exposure artifacts.
Some buttons are defect.	Camera button signals are failing. Reboot camera. If reappearing after reboot, contact service for button replacement. Mostly hardware problem.
SxS/Media: Data rate low. Check last clip.	Data rate of last recorded clip is very low. Check for artifacts in replay. Can also occure when forgetting to remove lens cap during recording.
Loading highspeed mode	While High Speed Mode is loading, the camera functionality is limited. Wait until High Speed mode loading has finished.
LDS failure. Reboot.	The lens data system has failed. Restart the camera if LDS is used.
M head: Clean fibre connection	The fibre signal quality of the ALEXA M camera is insufficient and requires cleaning of the connections.
M head: Power warning	The power level on the ALEXA M camera head is insufficient. Use a power source with a power supply of at least 40 W.
M head: High temperature	The temperature of the camera head is too high. Apply additional cooling to prevent automatic shutdown.
M head: Low fan speed	The fan of the ALEXA M camera head cannot reach a sufficient cooling speed. Fan might have to be cleaned or replaced.

ALEXA error messages and meanings

Main Bat: Low power	The battery attached to the BAT connector has reached its low level (10% below warning level). Battery must be replaced.
Onboard Bat: Low power	The onboard battery has reached its low level (10% below warning level). Battery must be replaced.

All Bats: Low power	Batteries on both BAT connector and onboard battery(s) have to be replaced.
Card 1/2: End of lifetime	The **SxS PRO** card in slot 1/2 has reached the end of its life cycle and has become read-only. Use a new card.
Media end of lifetime	The recording medium has reached the end of its life cycle and has become read-only. Use a new medium.
Card 1/2: Write speed error	The current write speed could not be handled by the **SxS PRO** card in slot 1/2.
Media: Write speed error	The current write speed could not be handled by therecording medium.
Cards 1&2: Full	Both **SxS PRO** cards are full. Use fresh cards.
Cards 1&2: End of lifetime	Both **SxS PRO** cards have reached the end of their life cycle and has become read-only. Use fresh cards.
Cards 1&2: Wrong file system	Both **SxS PRO** cards are not formatted in the file system required by the camera. Format the cards.
Cards 1&2: Rec protected	Both **SxS PRO** cards are rec-protected. Eject the cards, switch off the protection and re-insert the cards.
Camera overheating	The camera is getting too warm. Apply additional cooling or shut down to prevent hardware damage.
Low sensor temperature	Sensor temperature is out of range. Wait until error message disappears before continuing to shoot.
High sensor temperature	Sensor temperature is out of range. Wait until error message disappears before continuing to shoot.
System error	Reboot the camera.
Codec error. Reboot.	An error in the compression module has occured, and recording was aborted. Reboot the camera before you continue to record!

Sensor error. Reboot.	The image sensor has a problem. reboot the camera.
Sensor boot error	The sensor has not booted. Reboot the camera.
Interface error. Reboot.	An internal data interface has a problem. If rebooting does not solve the problem, contact the ARRI service.
Fan error. Contact service.	The fan module is not working properly. Either install an SFM-1, or contact the ARRI service.
Fatal system error. Shut down camera.	Camera has to be rebooted. If this error continues to occur, a hardware problem might be the reason. Contact the ARRI service.
Sync clock out of range.	The sync signal clock does not match the camera setting. Make sure the settings match!
Syncing sensor	Slave camera syncs to master camera. Wait until message disappears before starting to record!
Synced camera is not ready	One of the slave cameras is not ready for recording.
Software error. Reboot.	A part of the camera software has stopped functioning properly and requires a camera reboot.
Internal audio recording failed	Audio recording on internal medium failed.
REC OUT: Frame drops. Set fps.	Frame rate of REC OUT is smaller than sensor fps. Make sure REC OUT frame rate matches sensor fps.
Dual recording failed. Check cards.	With dual recording active, the two **SxS PRO** cards must have identical file structure. Use two fresh **SxS PRO** cards and analyze the not matching ones.
REC OUT: Frame drops. Set FPS.	**SxS** is switched off, and sensor fps is higher than REC OUT fps. Increase REC OUT fps to at least the sensor fps value.
REC error. Reboot.	Error in the recording module. Reboot camera.
Mirror shutter not calibrated	ALEXA Studio only. Mirror shutter must be calibrated by ARRI service.

Mirror shutter phase error	ALEXA Studio only. Mirror shutter continuosly not in phase with sensor. If rebooting does not solve the problem, contact ARRI service.
Mirror shutter: Cannot reach sync speed	ALEXA Studio only. Mirror shutter continuosly not reaching sync speed. If rebooting does not solve the problem, contact ARRI service.
No M head detected. Reboot.	ALEXA M was booted without head connected. Connect head and reboot camera.
Fibre Connection Error	Fibre connection between ALEXA M head and backend could not be established or has terminated. Check and clean connection, then reboot.
M head: Low power	The power level of the ALEXA M head is critical. Make sure power supply can deliver at least 40 W of power. Check if power warning levels are set correctly.
M head: Temperature high	The temperature of the ALEXA M head is too high. Apply additional cooling to prevent automatic shutdown.
M head: Fan error. Contact service.	The fan of the ALEXA M camera head is defect. If replacing the fan does not solve the problem, contact the camera service.

If any error that requires rebooting continues to occur regularly, contact the ARRI service.

A.5 Dimensions, Weights and Menu Structure Trees

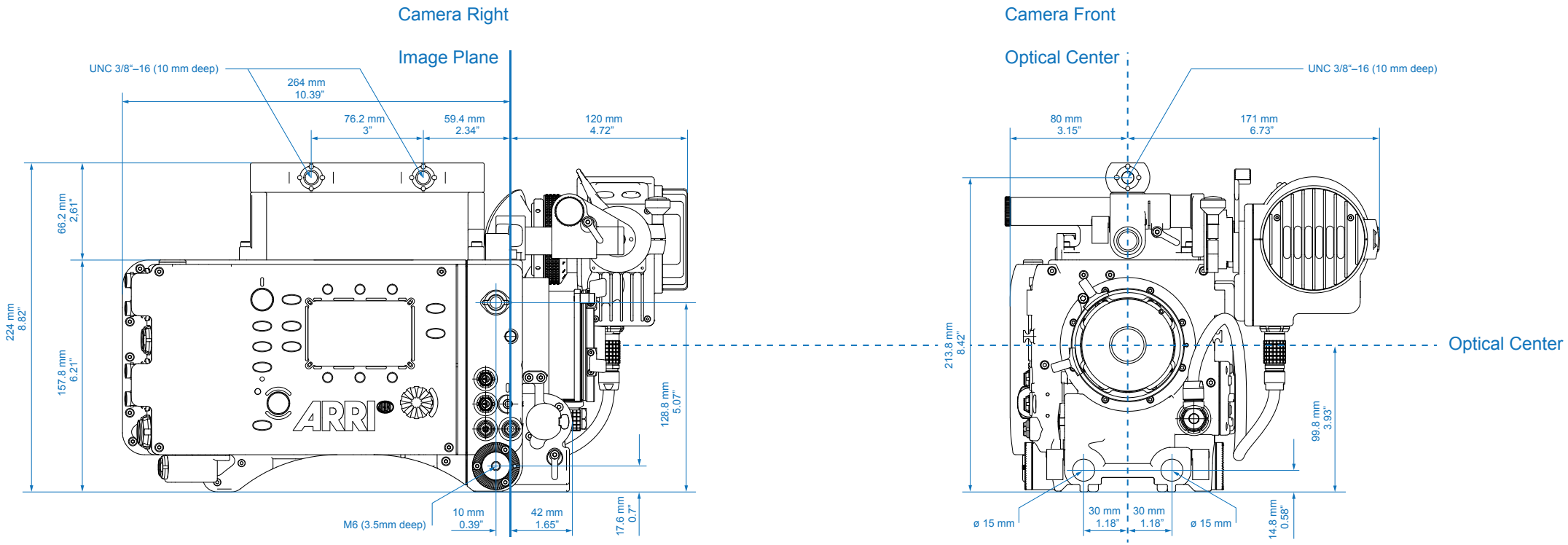
Dimensional drawings including weights information are attached to the end of this document. A version with higher resolution can be downloaded from the ARRI website:
http://www.arri.com/camera/digital_cameras/downloads.

A Menu Structure Tree can also be found at the end of this document.

ALEXA

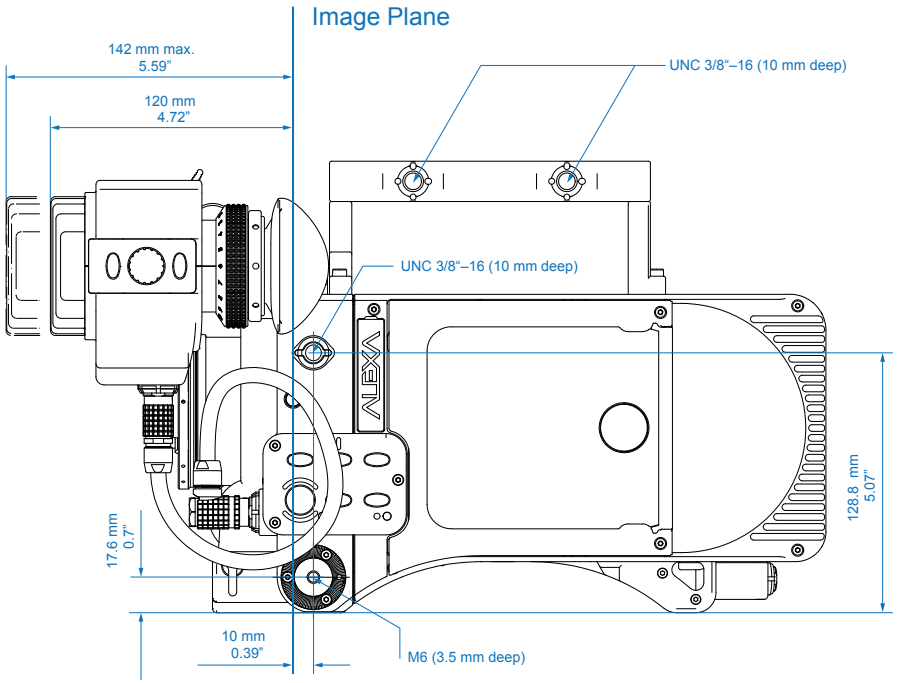
CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

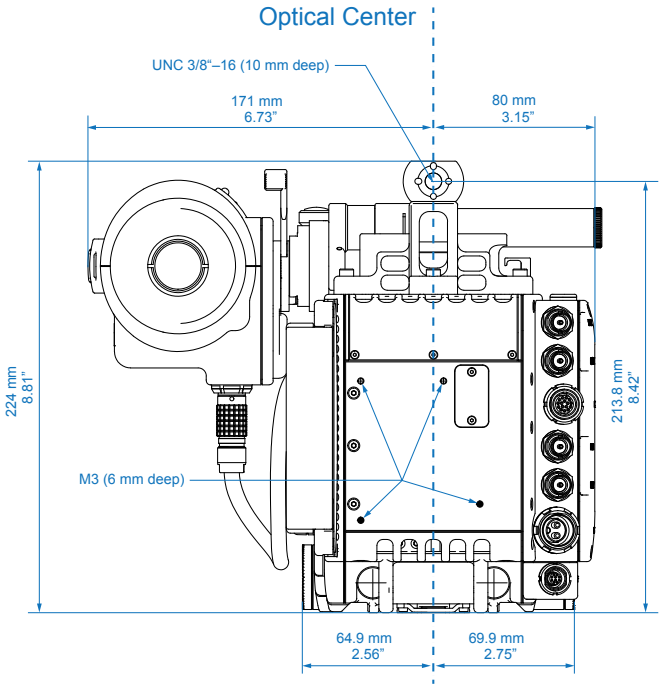


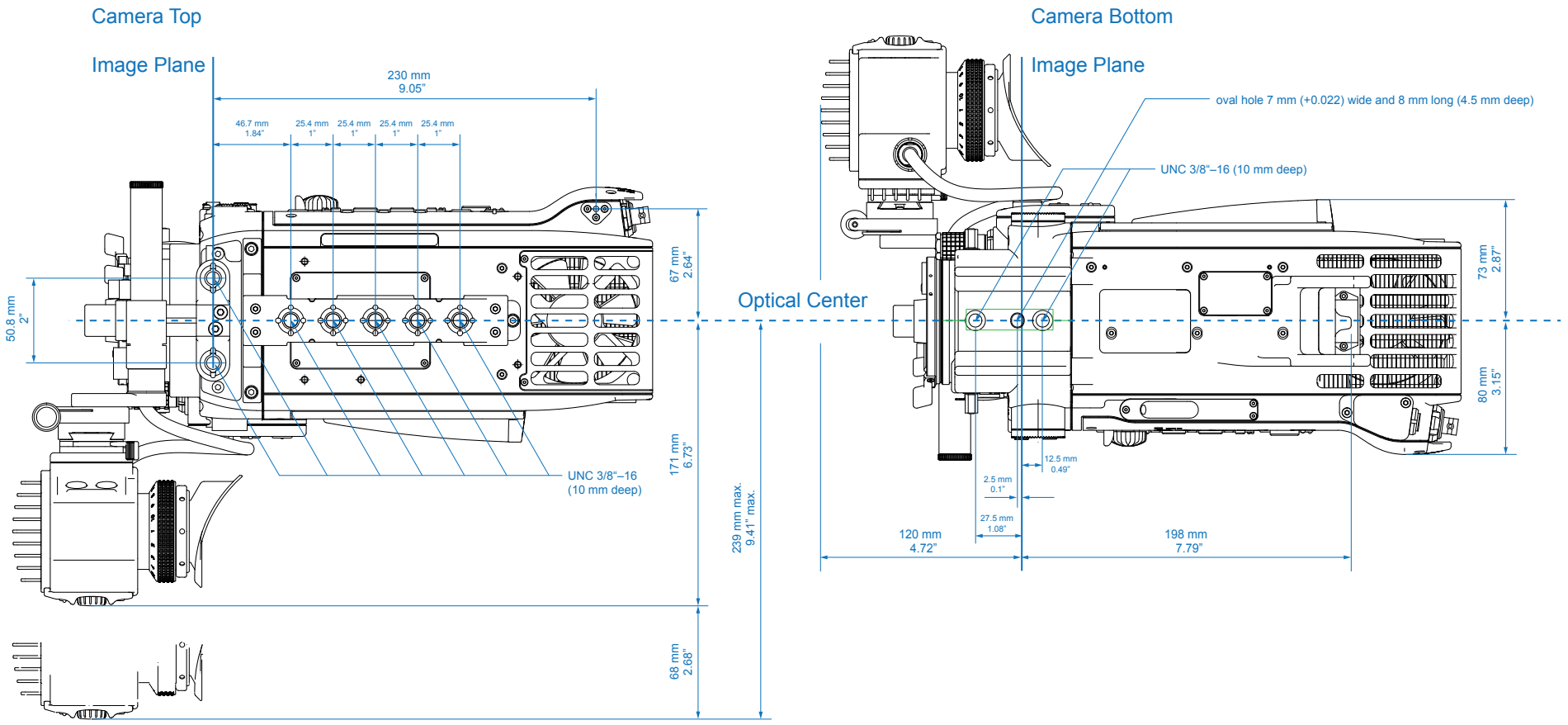
ALEXA	Length	Width	Height	Weight
Body, Camera Center Handle (CCH-1)	321 mm - 12.64"	153 mm - 6.02"	224 mm - 8.82"	6.5 kg - 14.33 lb
Body, Camera Center Handle (CCH-1), Electronic Viewfinder EVF-1, Viewfinder Mounting Bracket (VMB-1)	384 mm - 15.12"	251 mm - 9.88"	" - "	7.5 kg - 16.53 lb
Body, Camera Center Handle (CCH-1), Electronic Viewfinder EVF-1 extended, Viewfinder Mounting Bracket (VMB-1)	406 mm - 15.98"	319 mm - 12.56"	" - "	7.5 kg - 16.53 lb

Camera Left



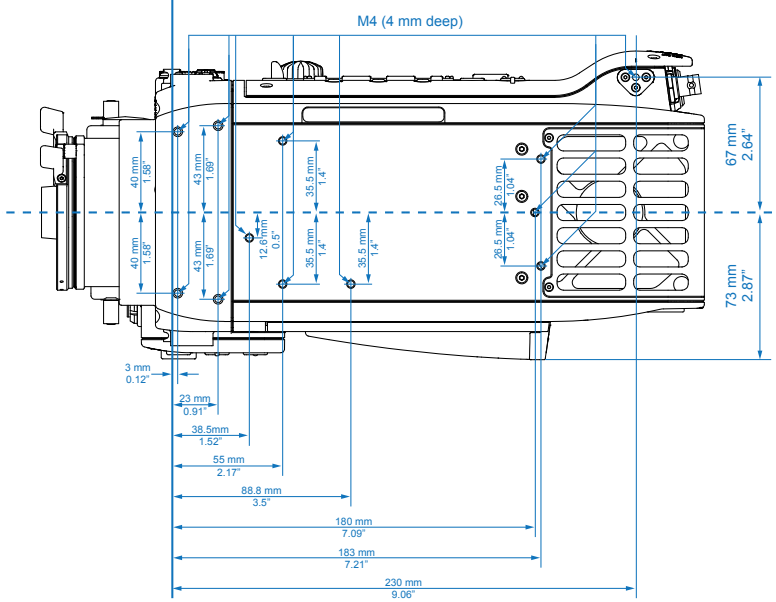
Camera Back




Camera Top
Image Plane
230 mm
9.05"
46.7 mm
1.84"
25.4 mm
1"
25.4 mm
1"
25.4 mm
1"
25.4 mm
1"
50.8 mm
2"
67 mm
2.64"
171 mm
6.73"
68 mm
2.68"
239 mm max.
9.41" max.
UNC 3/8"–16
(10 mm deep)
Optical Center
Camera Bottom
Image Plane
oval hole 7 mm (+0.022) wide and 8 mm long (4.5 mm deep)
UNC 3/8"–16 (10 mm deep)
73 mm
2.87"
80 mm
3.15"
12.5 mm
0.49"
2.5 mm
0.1"
27.5 mm
1.08"
120 mm
4.72"
198 mm
7.79"

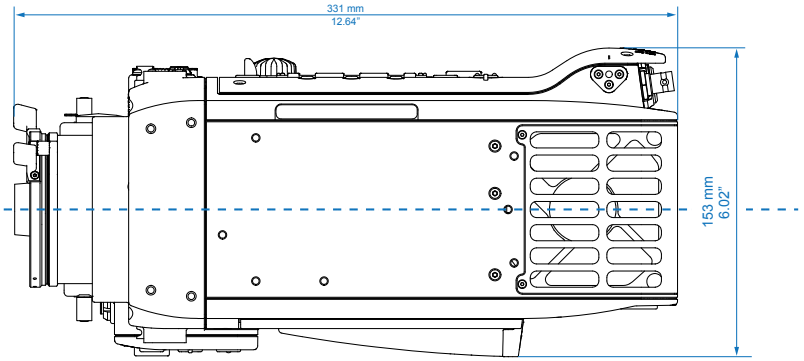
Camera Top

Image Plane



Optical Center

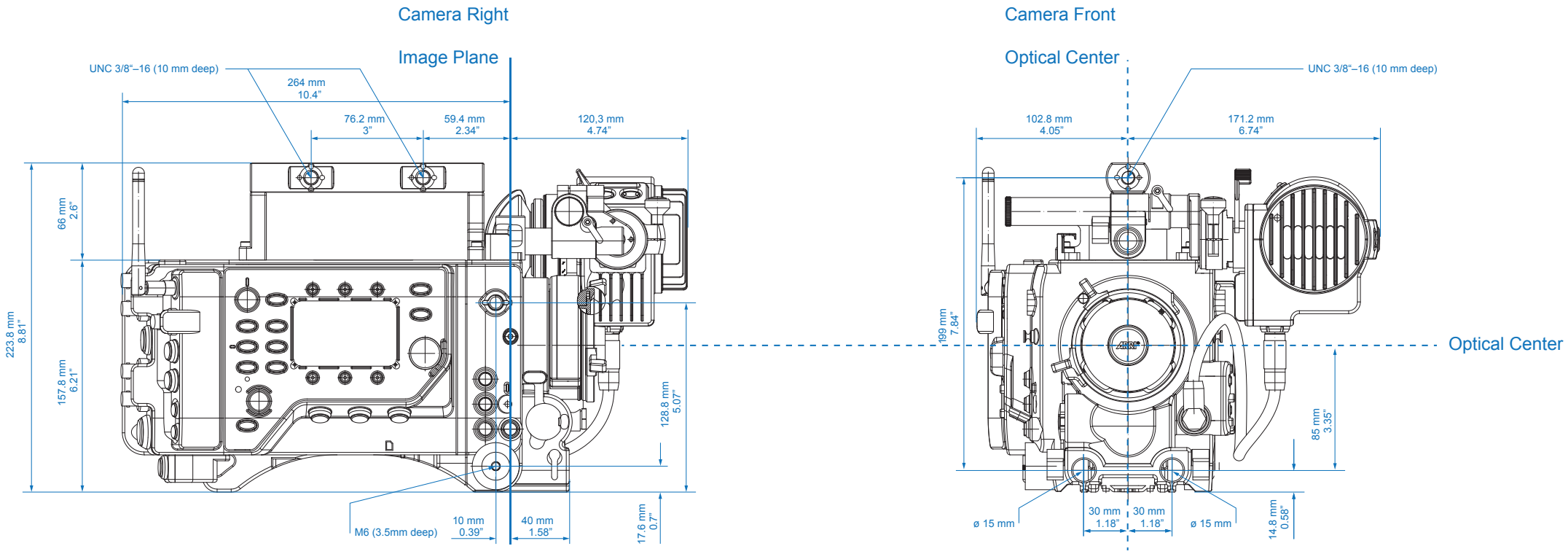
Camera Top



ALEXA Plus

CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.



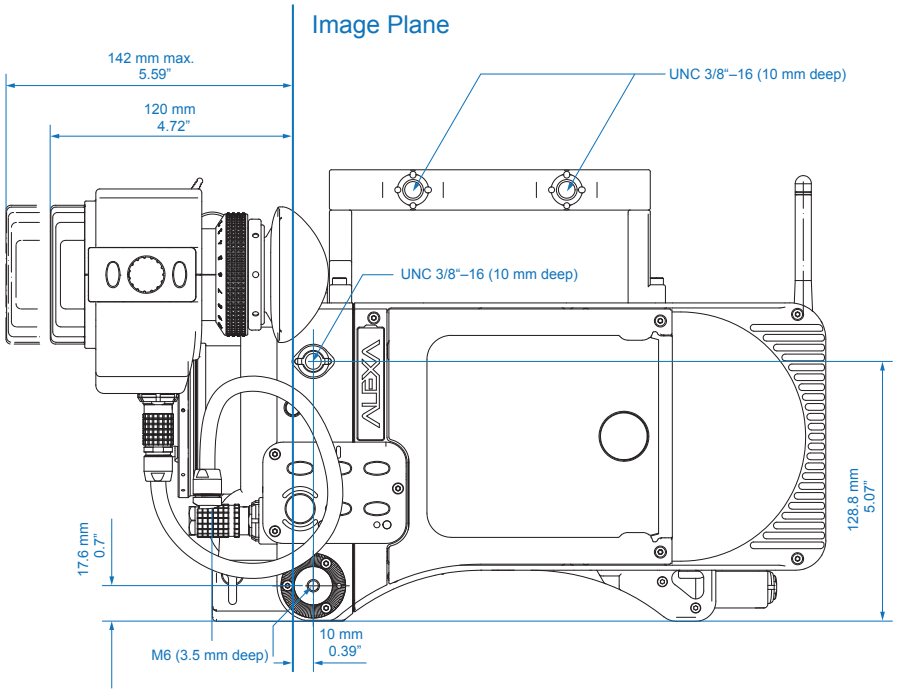
ALEXA Plus	Length	Width	Height	Weight
Body, SxS Module	332 mm - 12.95"	175 mm - 6.89"	158 mm - 6.22"	7.0 kg - 15.4 lb
Body, SxS Module, Camera Center Handle (CCH-1), Electronic Viewfinder EVF-1	384 mm - 15.12"	274 mm - 10.8"	224 mm - 8.82"	8.4 kg - 18.5 lb

ALEXA Plus

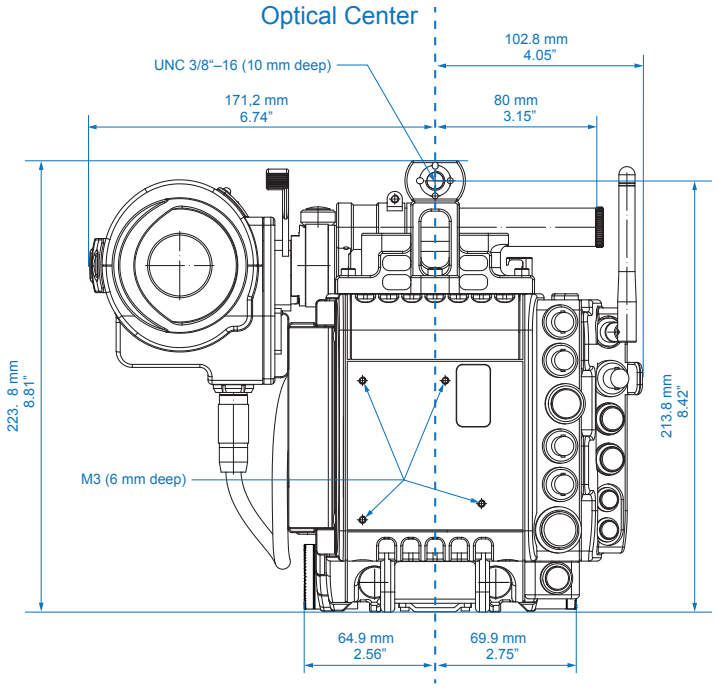
CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

Camera Left



Camera Back

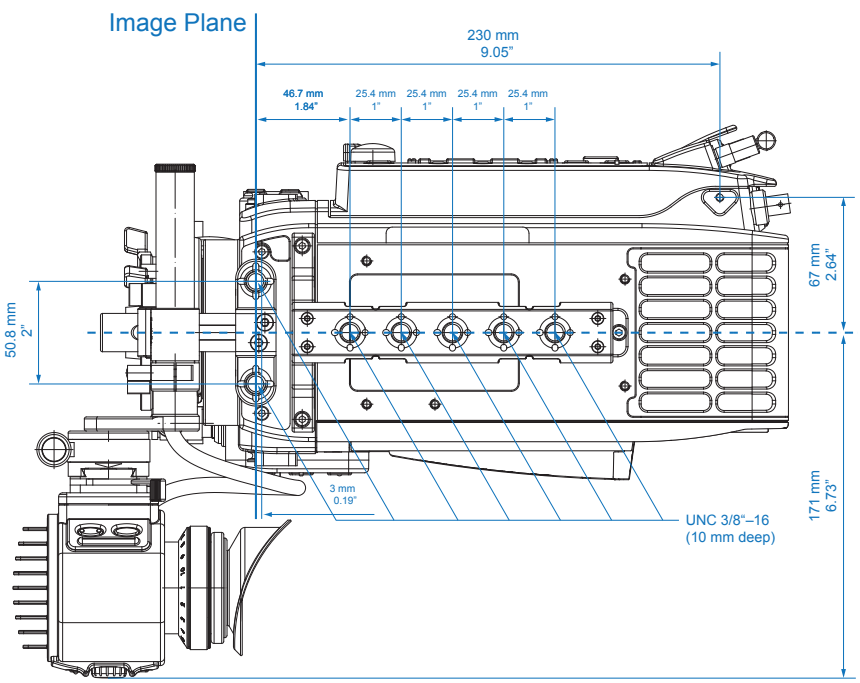


ALEXA Plus

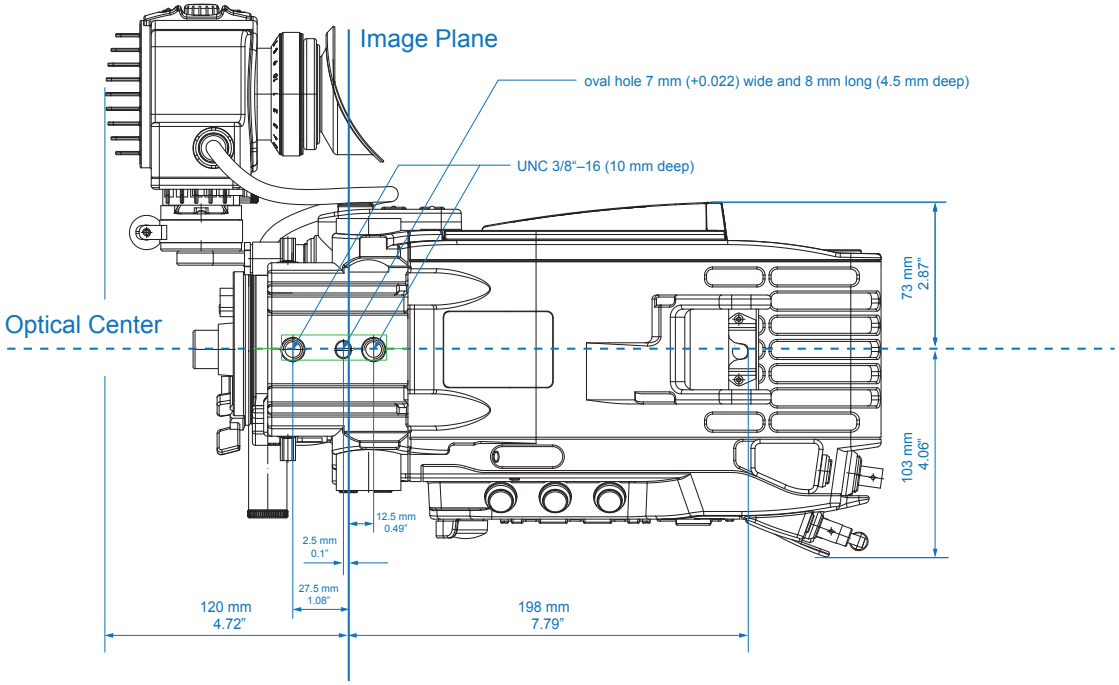
CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

Camera Top



Camera Bottom

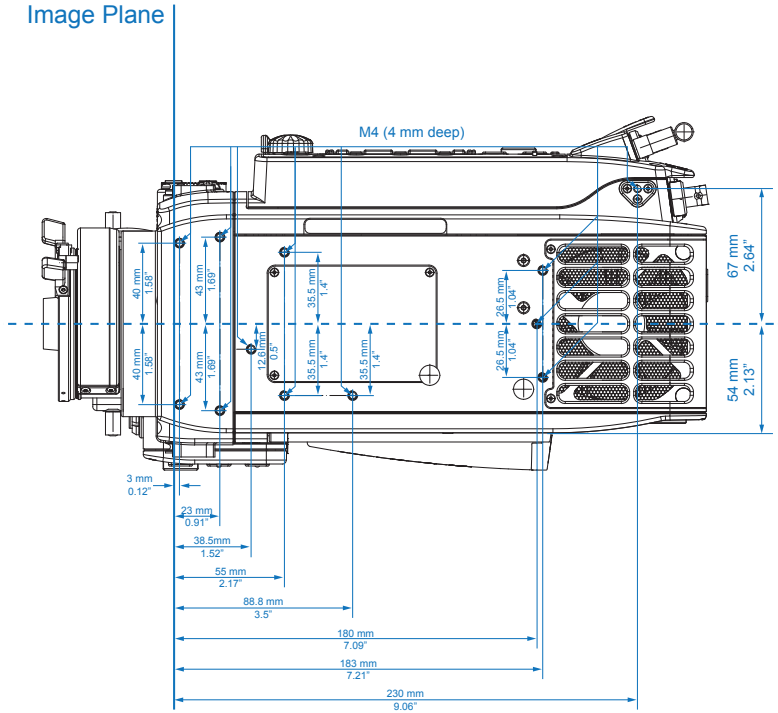


ALEXA Plus

CAMERA DIMENSIONS – **Version 2012-03**

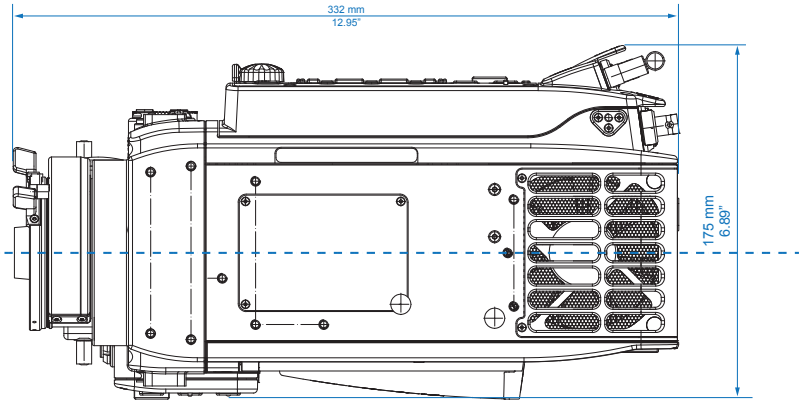
Technical Data are subject to change without notice.

Camera Top



Optical Center

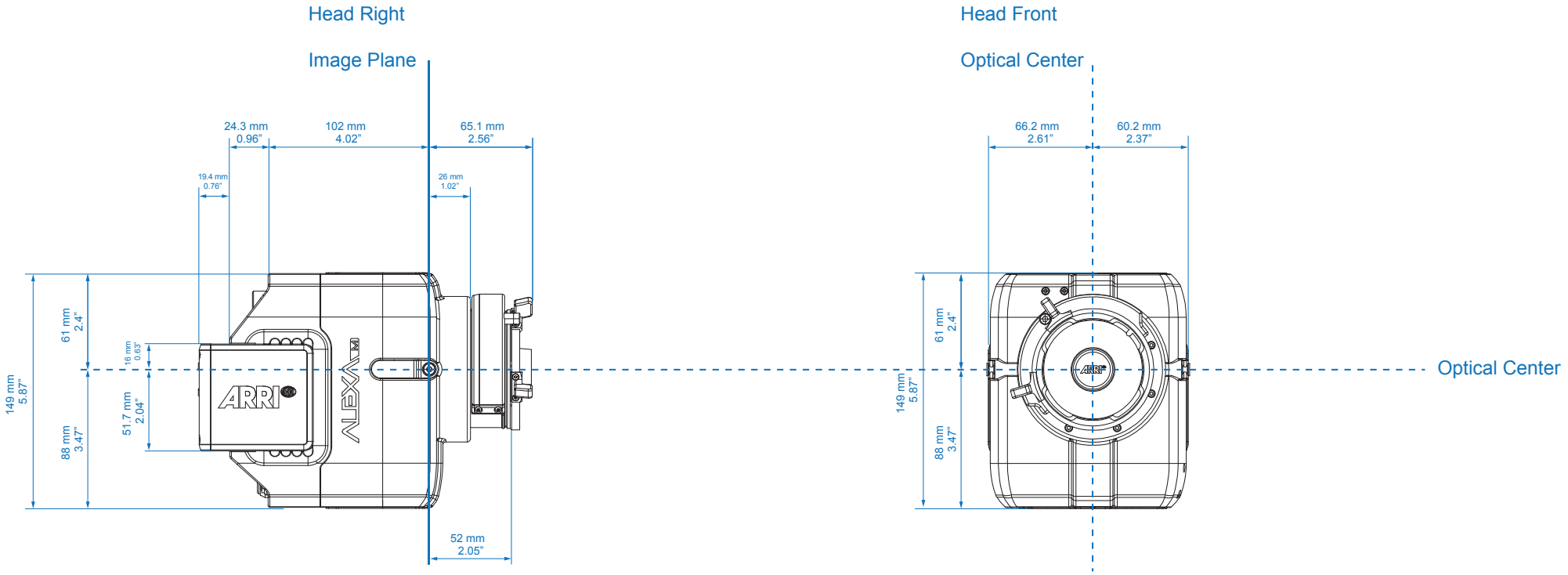
Camera Top



ALEXA M

CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

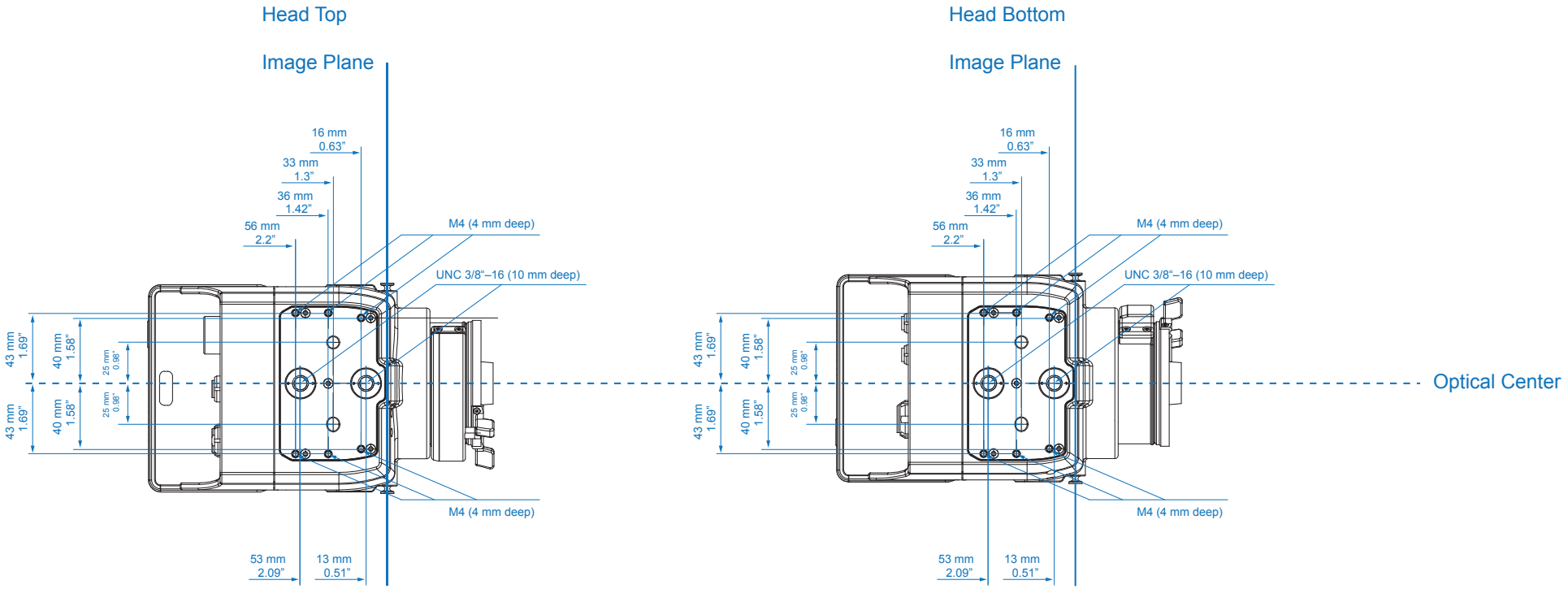


ALEXA M	Length	Width	Height	Weight
ALEXA M Head	212 mm - 8.35”	129 mm - 5.08”	149 mm - 5.87”	2.9 kg - 6.39 lb
ALEXA M Backend	323 mm - 12.72”	153 mm - 6.02”	158 mm - 6.22”	5.5 kg - 12 lb

ALEXA M

CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

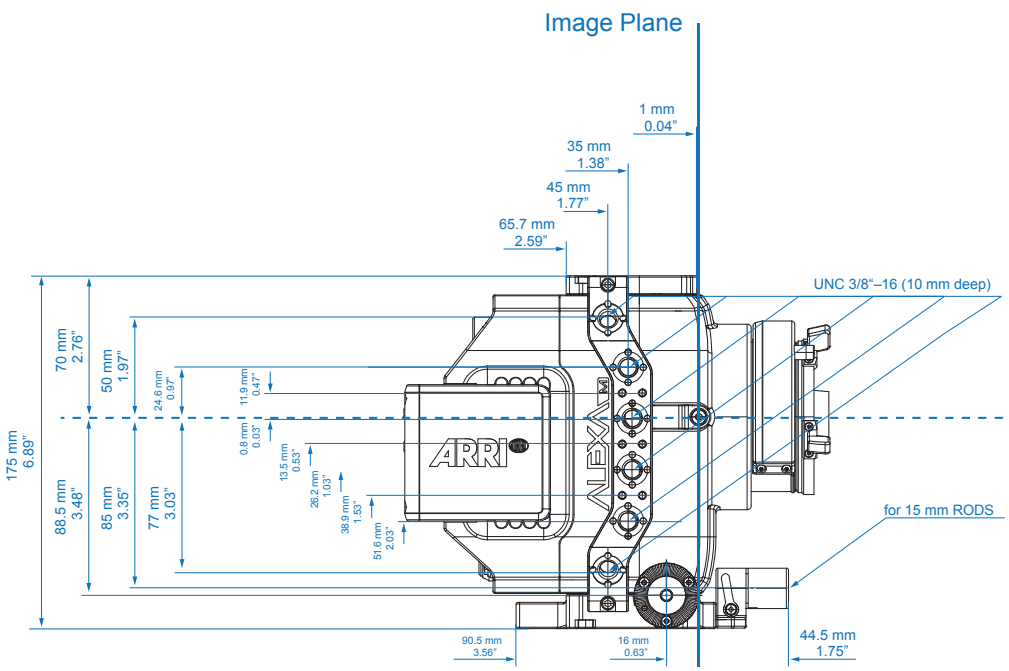


ALEXA M

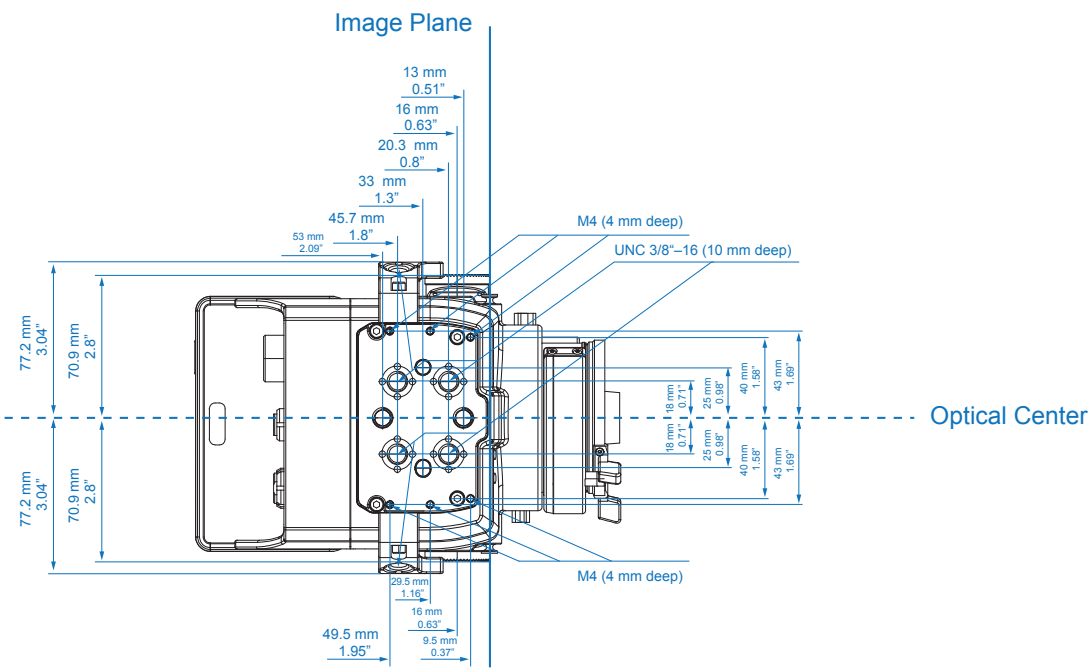
CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

Head with Cage Right



Head with Cage Top

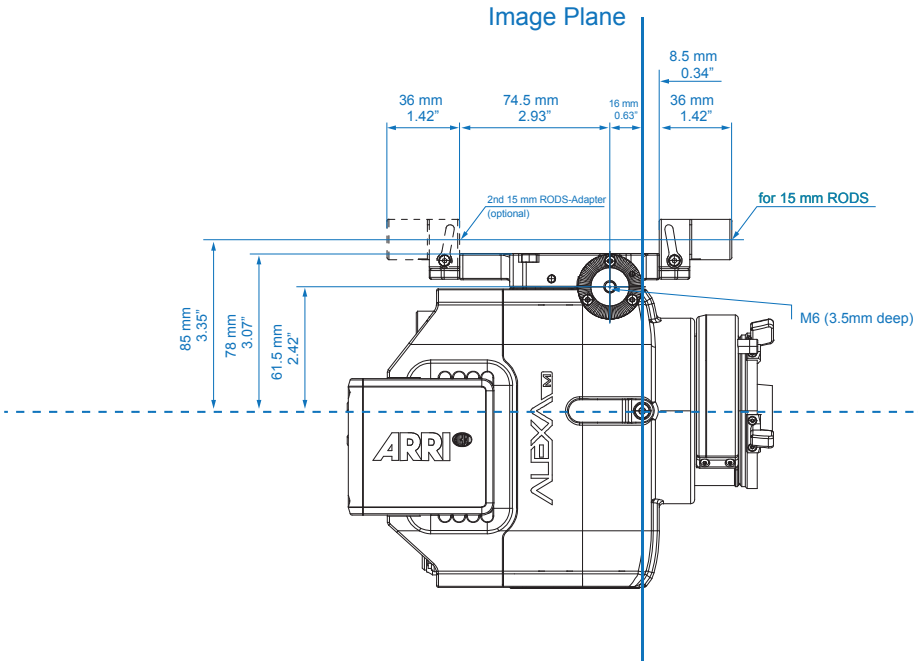


ALEXA M

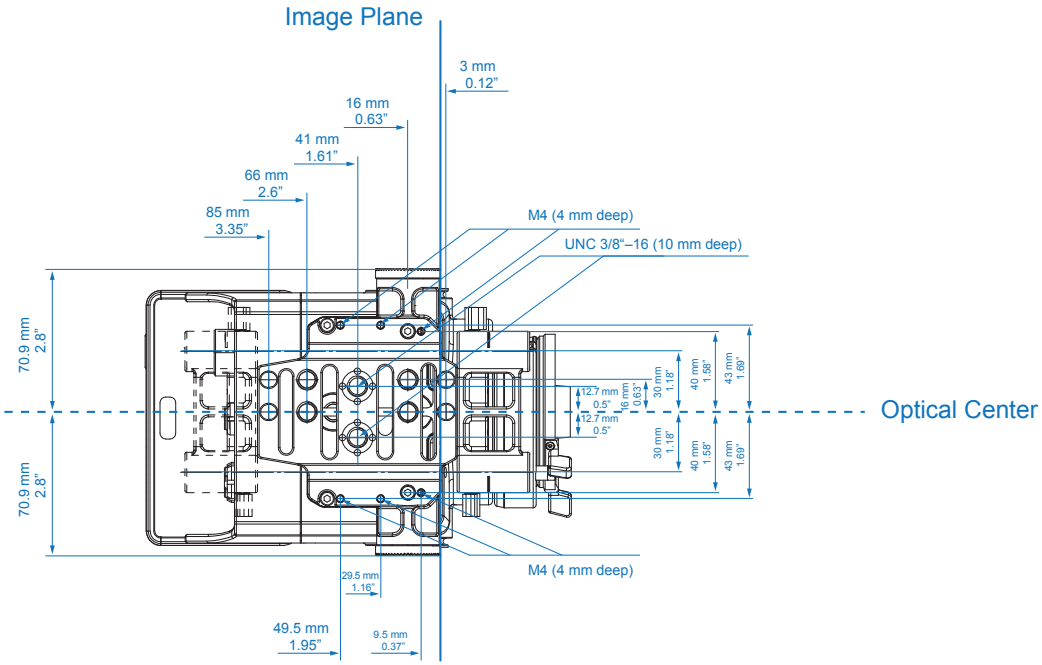
CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

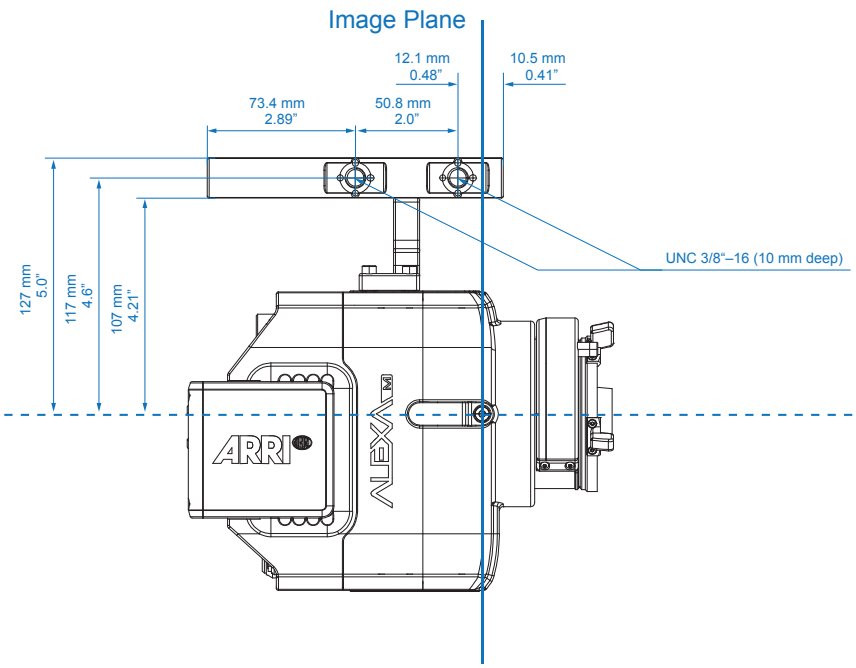
Head with HEAD-PLATE-2 Right



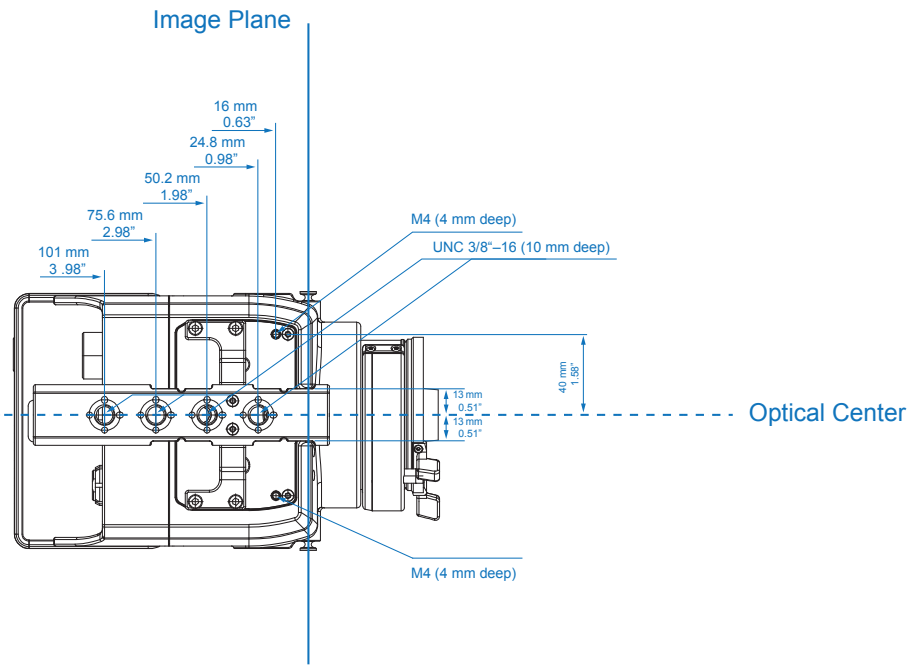
Head with HEAD-PLATE-2 Top



Head with Handle Right



Head with Handle Top

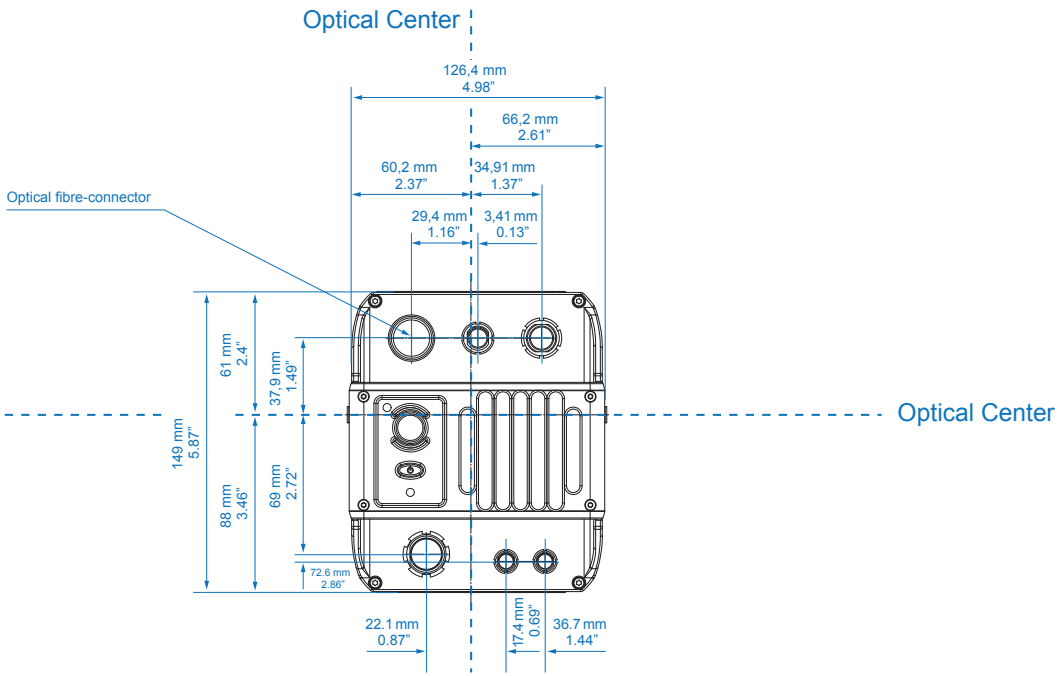


ALEXA M

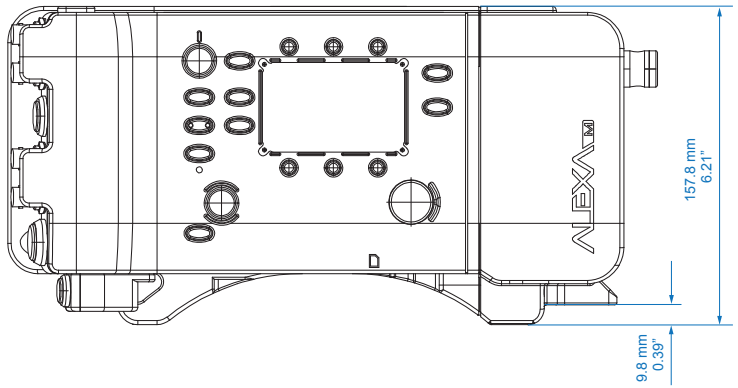
CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

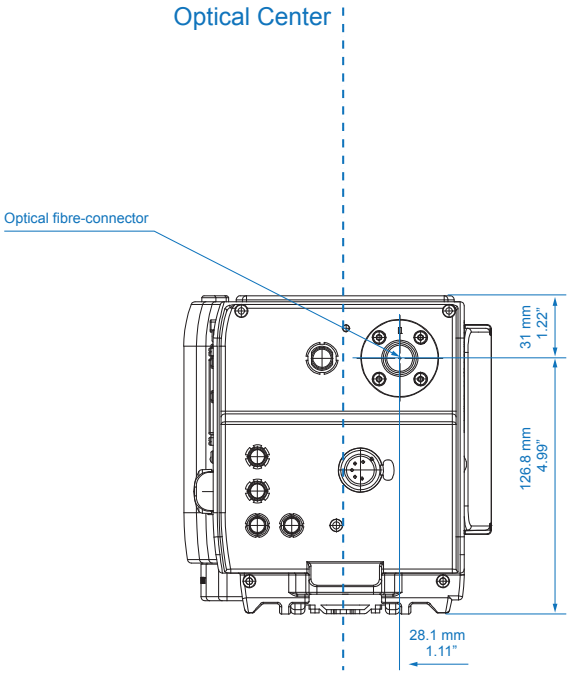
Head Rear View



Backend Right



Backend Front

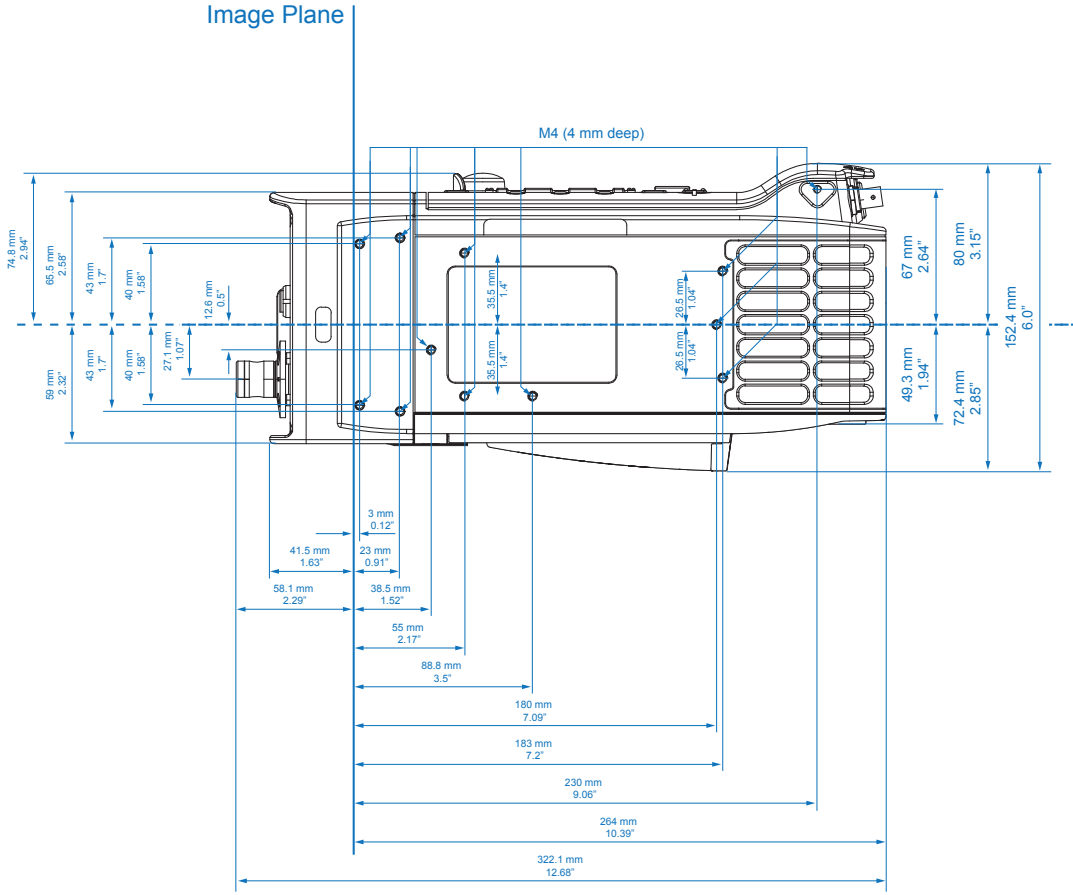


ALEXA M

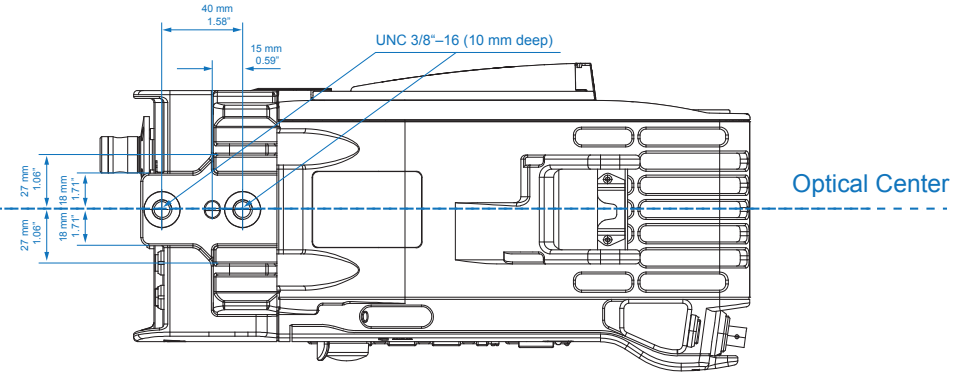
CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

Backend Top



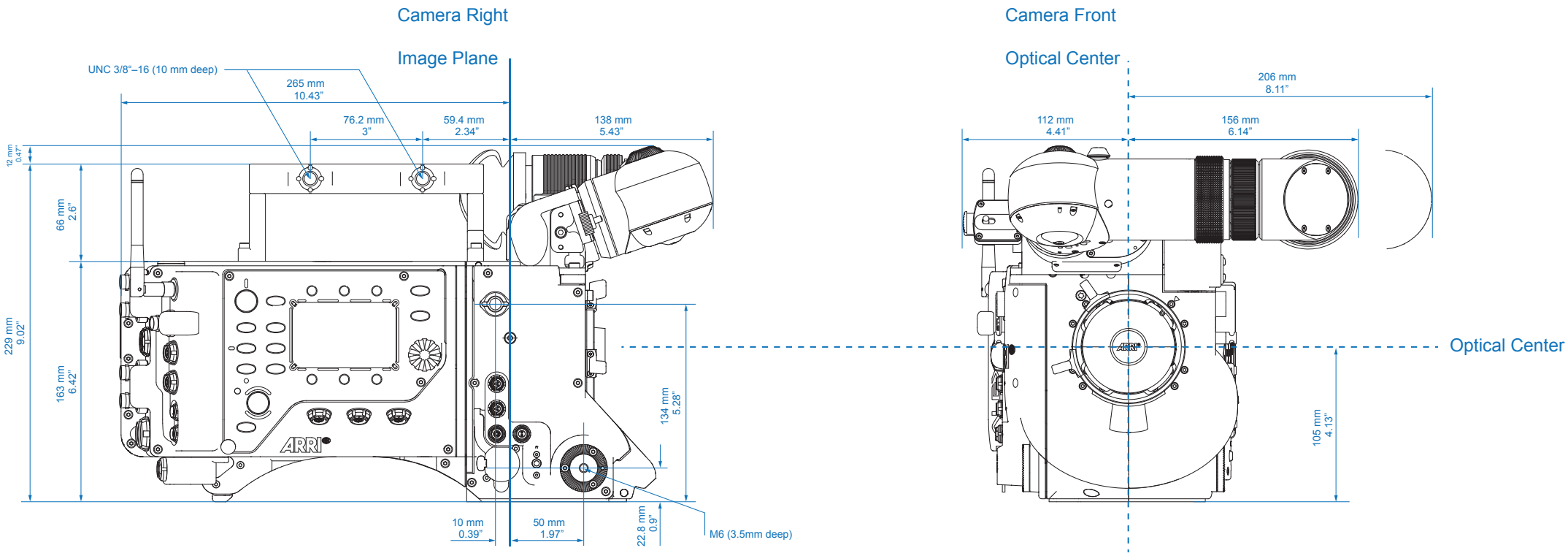
Backend Bottom



ALEXA Studio

CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.



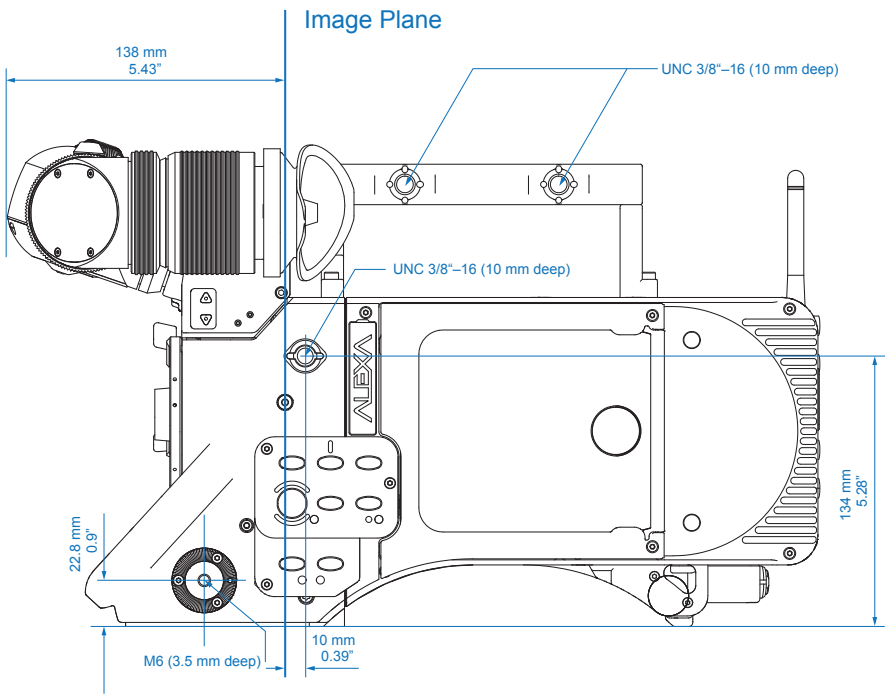
ALEXA Studio	Length	Width	Height	Weight
Body, SxS Module	364 mm - 14.33"	177 mm - 6.97"	163 mm - 6.42"	8.0 kg - 17.6 lb
Body, SxS Module, Camera Center Handle (CCH-1), Optical Viewfinder OVF-1	402 mm - 15.9"	268 mm - 10.55"	241 mm - 9.49"	10.2 kg - 22.5 lb

ALEXA Studio

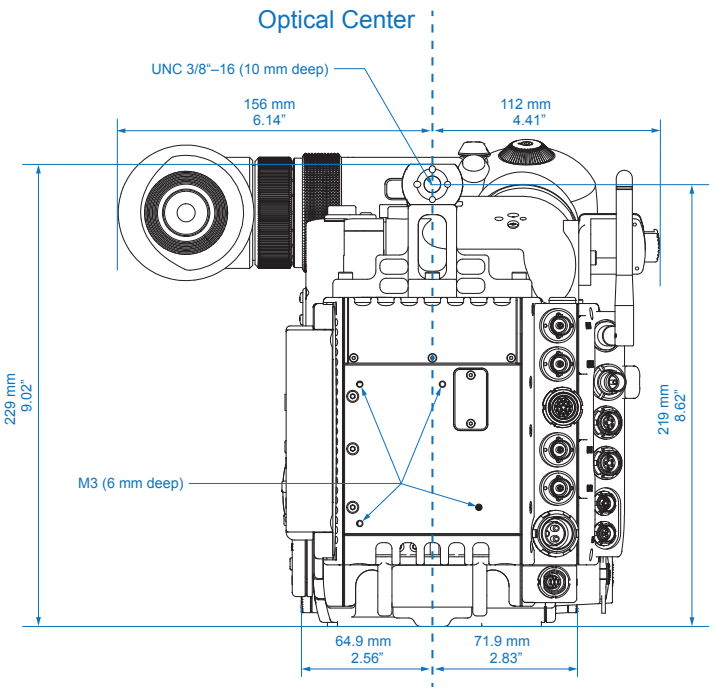
CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

Camera Left



Camera Back

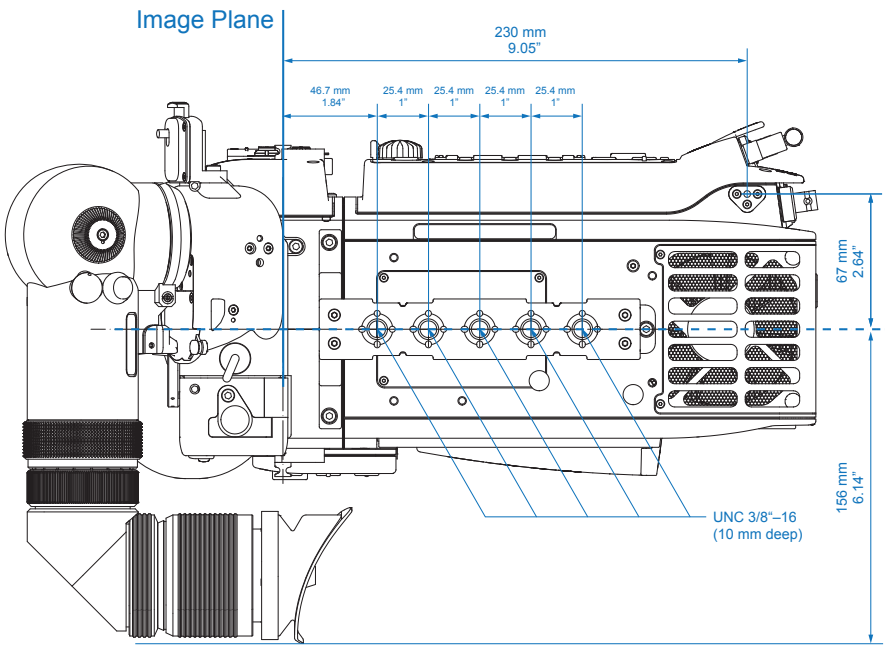


ALEXA Studio

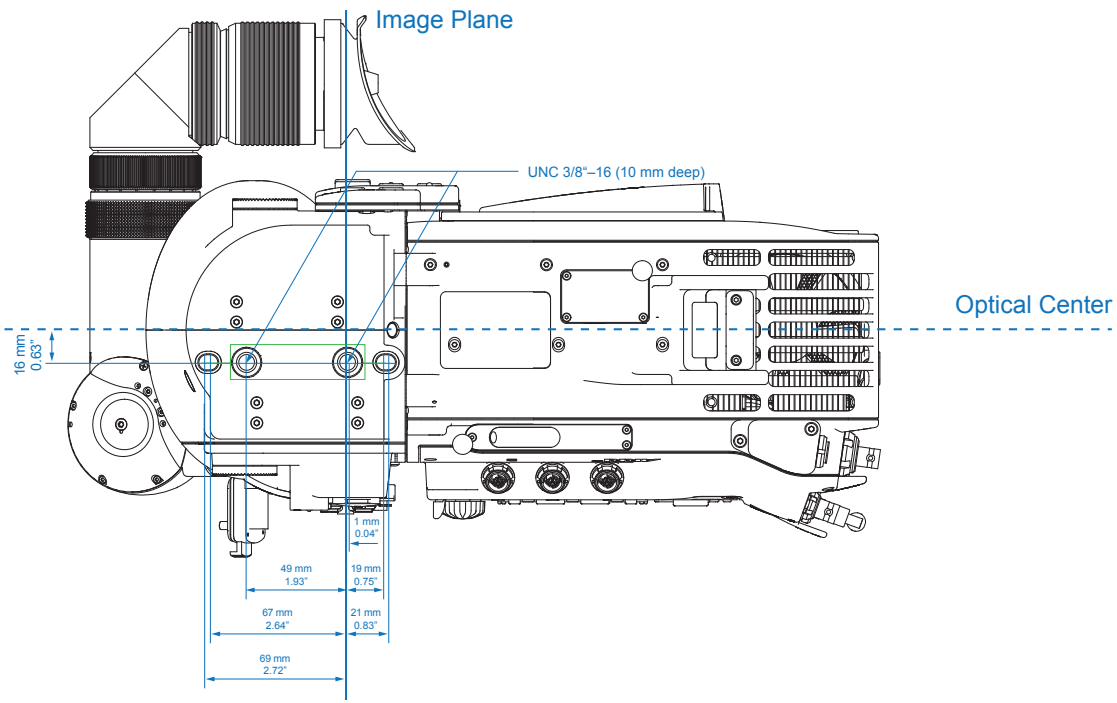
CAMERA DIMENSIONS – **Version 2012-03**

Technical Data are subject to change without notice.

Camera Top



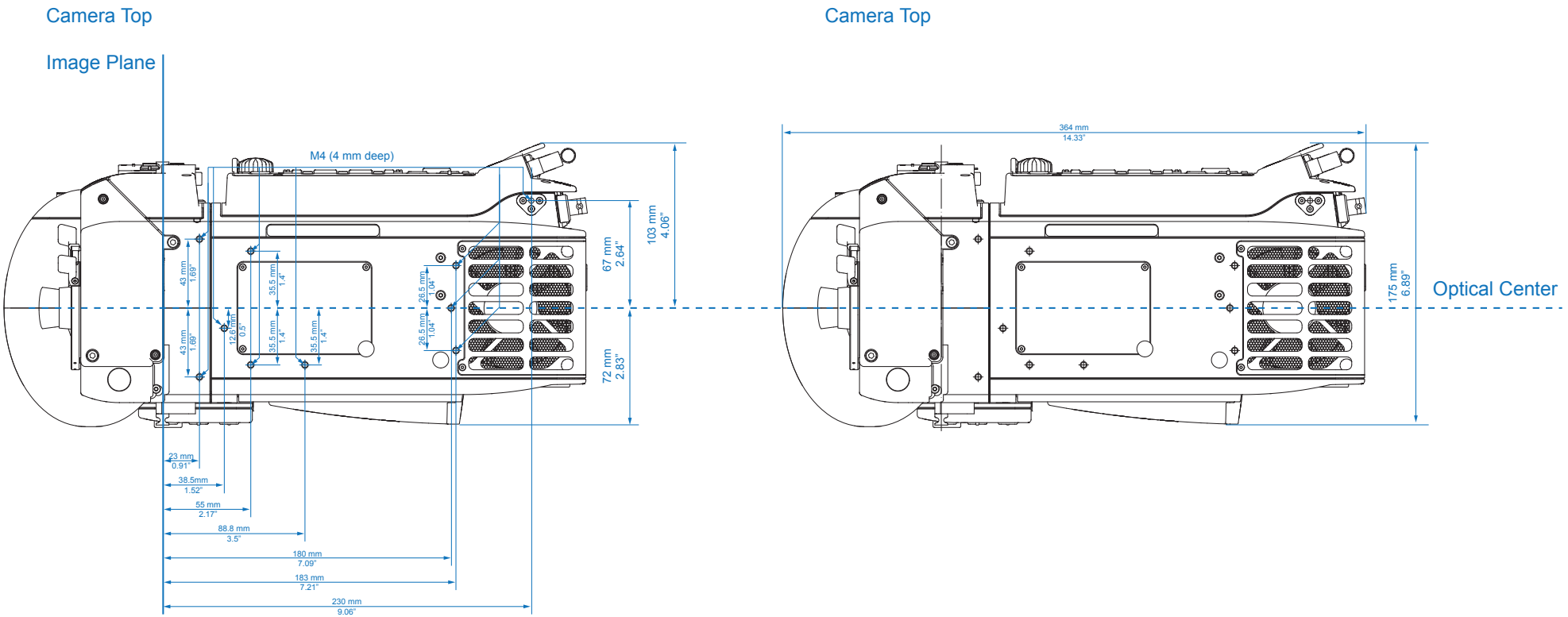
Camera Bottom



ALEXA Studio

CAMERA DIMENSIONS – **Version 2012-03**

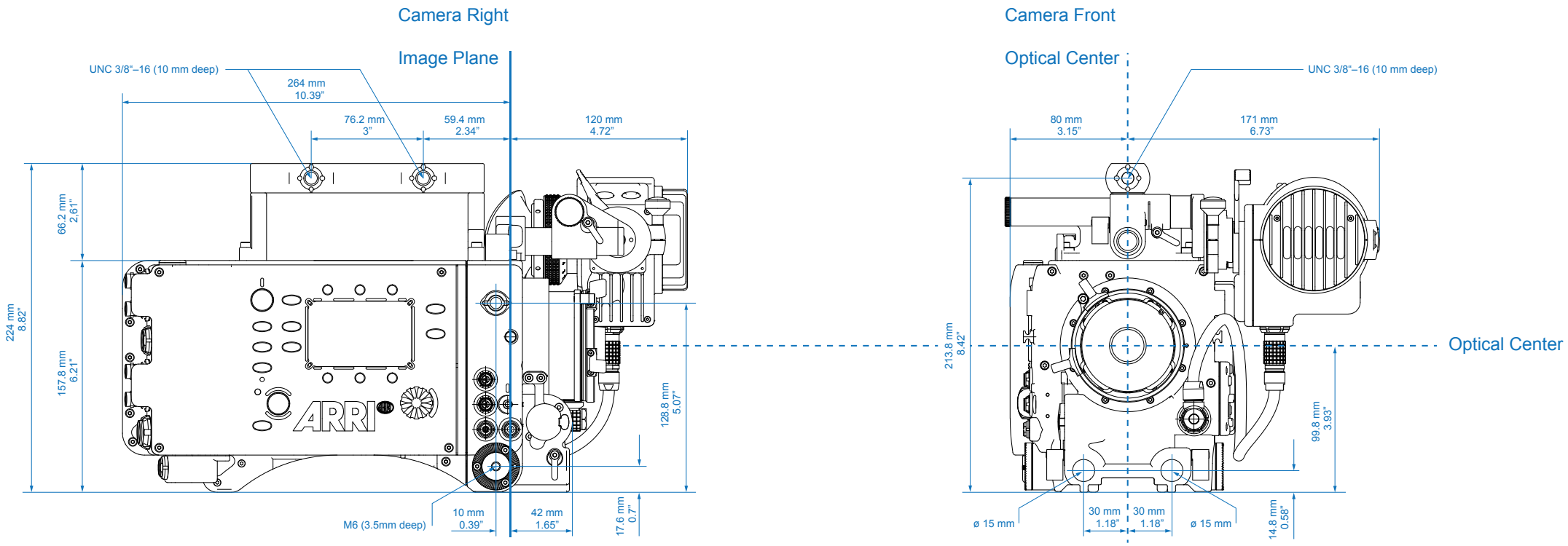
Technical Data are subject to change without notice.



ALEXA with XR Module

CAMERA DIMENSIONS – **Version 2013-04**

Technical Data are subject to change without notice.



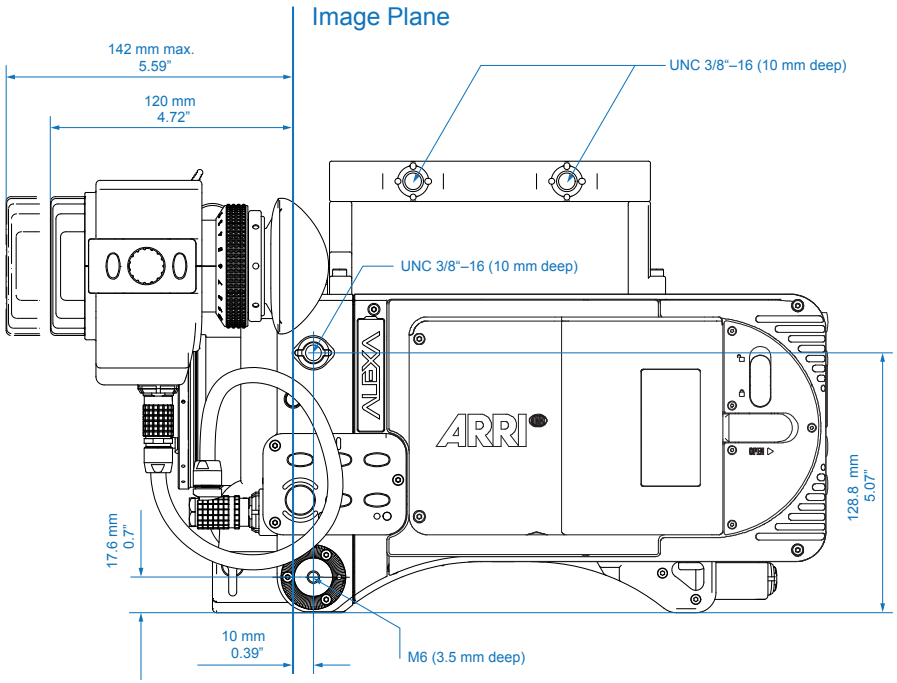
ALEXA	Length	Width	Height	Weight
Body, Camera Center Handle (CCH-1)	321 mm - 12.64"	161.6 mm - 6.36"	224 mm - 8.82"	6.6 kg - 14.6 lb
Body, Camera Center Handle (CCH-1), Electronic Viewfinder EVF-1, Viewfinder Mounting Bracket (VMB-1)	384 mm - 15.12"	251 mm - 9.88"	" - "	8.0 kg - 17.6 lb
Body, Camera Center Handle (CCH-1), Electronic Viewfinder EVF-1 extended, Viewfinder Mounting Bracket (VMB-1)	406 mm - 15.98"	319 mm - 12.56"	" - "	8.0 kg - 17.6 lb

ALEXA with XR Module

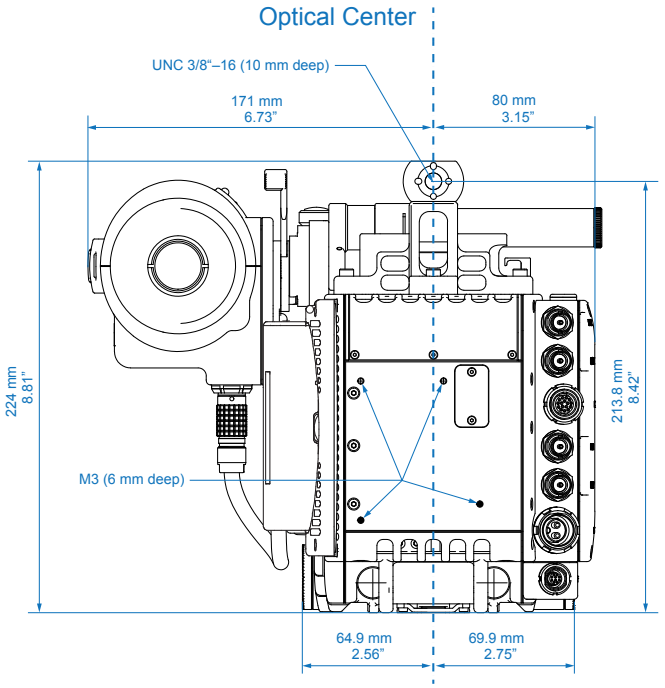
CAMERA DIMENSIONS – **Version 2013-04**

Technical Data are subject to change without notice.

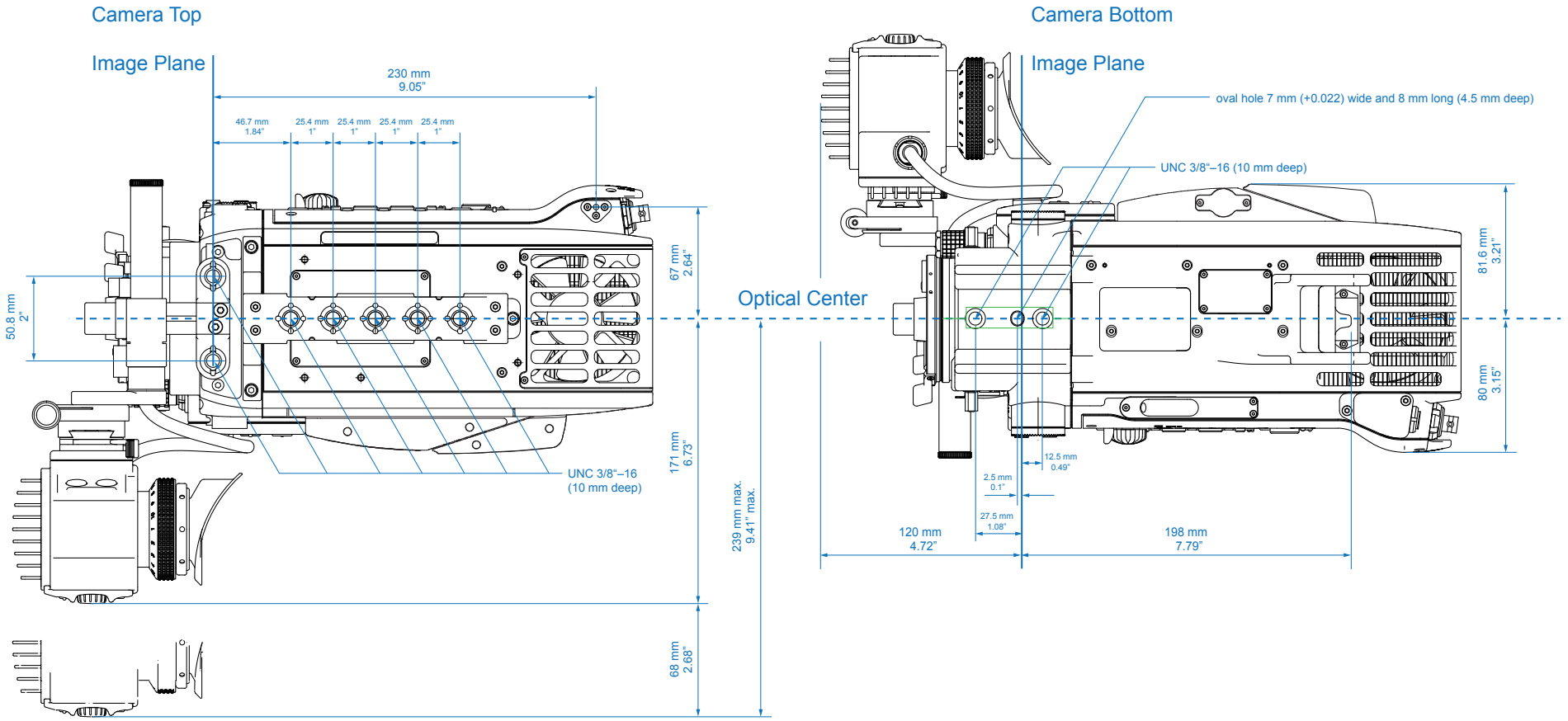
Camera Left



Camera Back

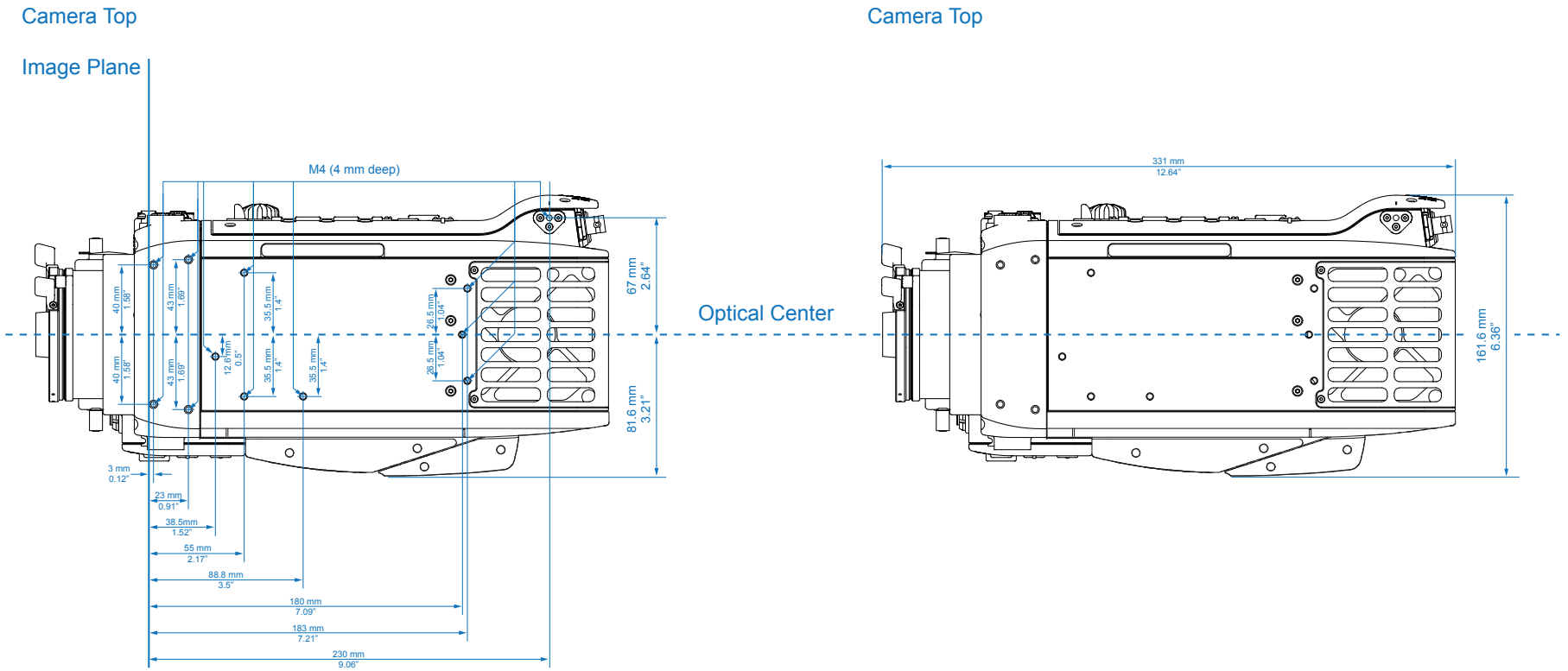


ALEXA with XR Module



ALEXA with XR Module

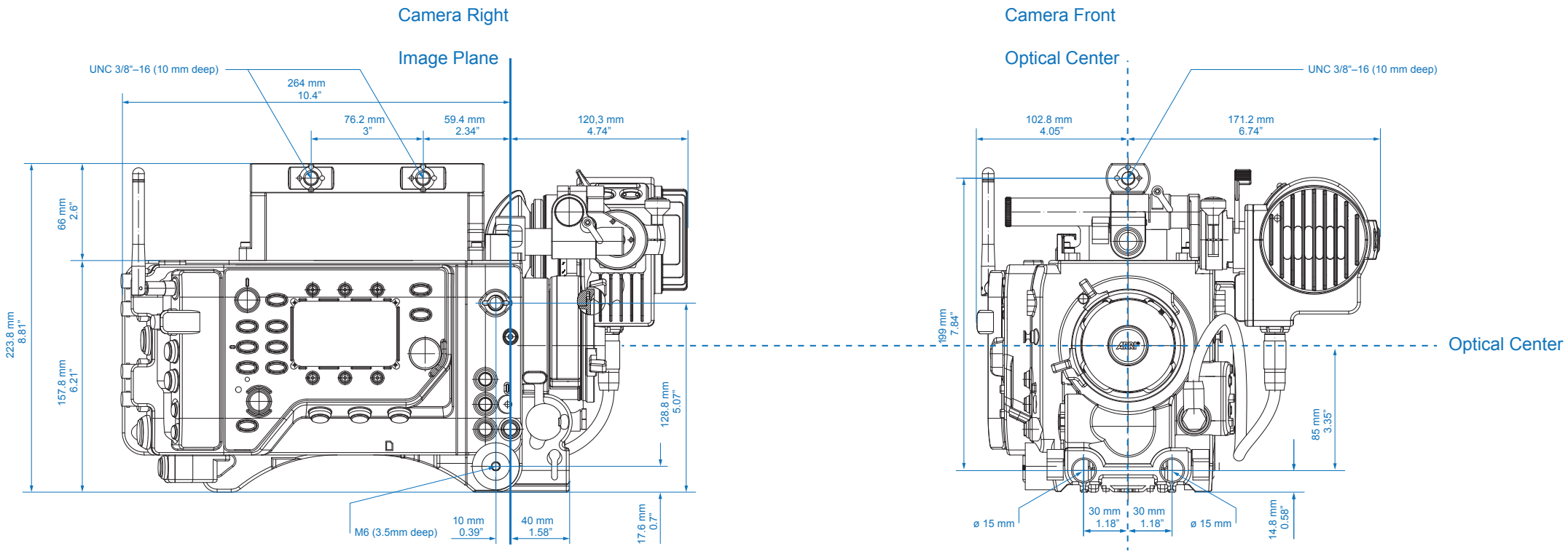
Technical Data are subject to change without notice.



ALEXA Plus with XR Module

CAMERA DIMENSIONS – **Version 2013-04**

Technical Data are subject to change without notice.



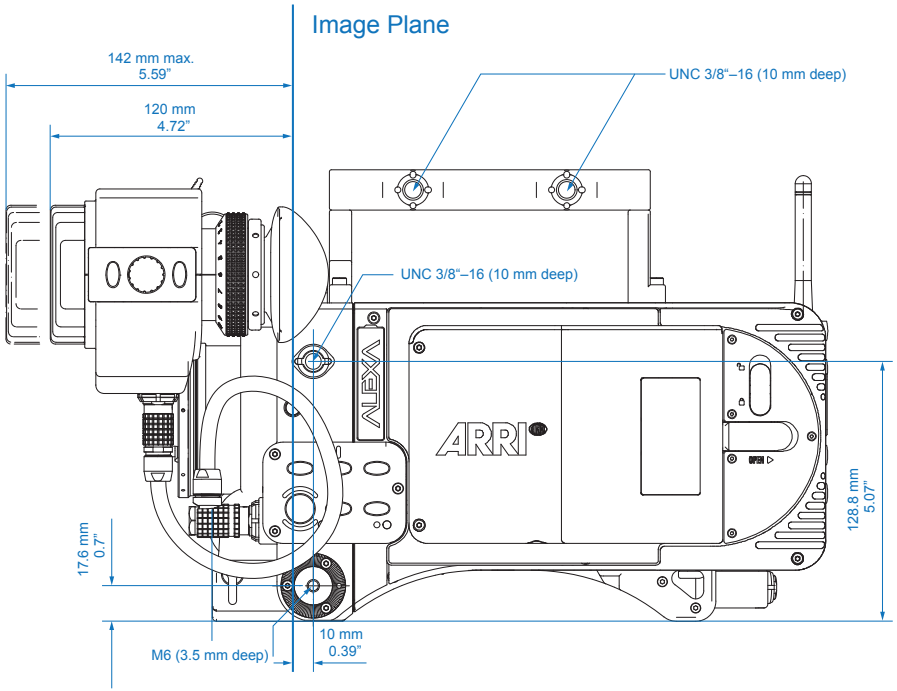
ALEXA Plus	Length	Width	Height	Weight
Body, XR Module	332 mm - 12.95"	184.6 mm - 7.27"	158 mm - 6.22"	7.3 kg - 16.1 lb
Body, XR Module, Camera Center Handle (CCH-1), Electronic Viewfinder EVF-1	384 mm - 15.12"	274 mm - 10.8"	224 mm - 8.82"	8.7 kg - 19.2 lb

ALEXA Plus with XR Module

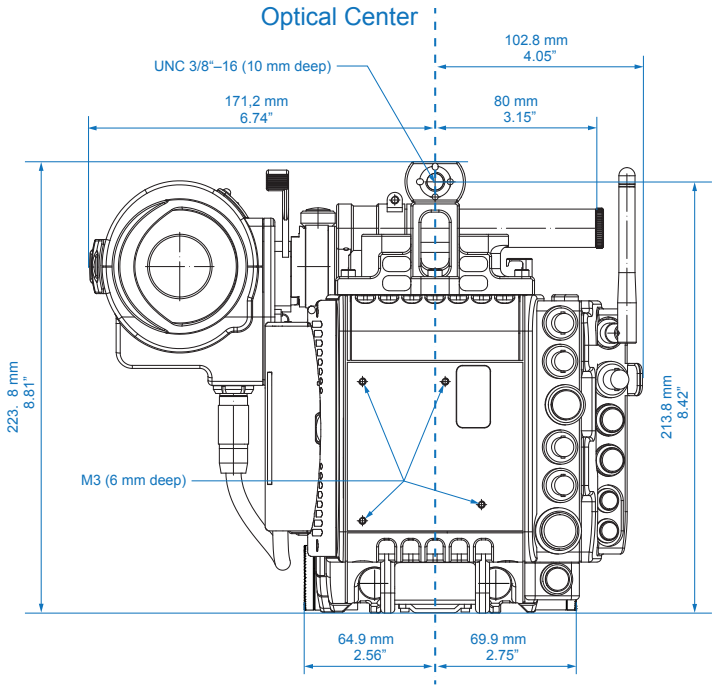
CAMERA DIMENSIONS – **Version 2013-04**

Technical Data are subject to change without notice.

Camera Left



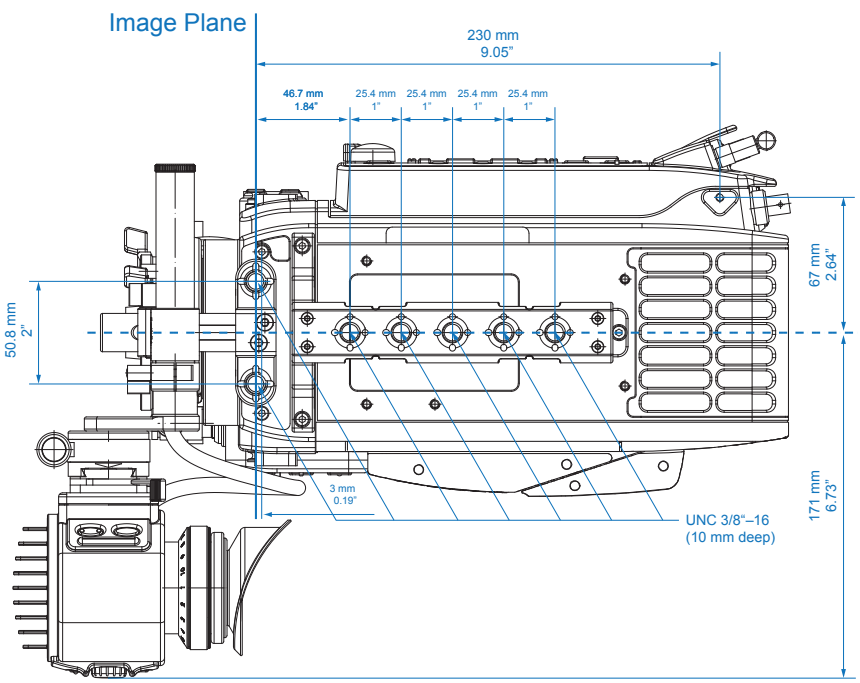
Camera Back



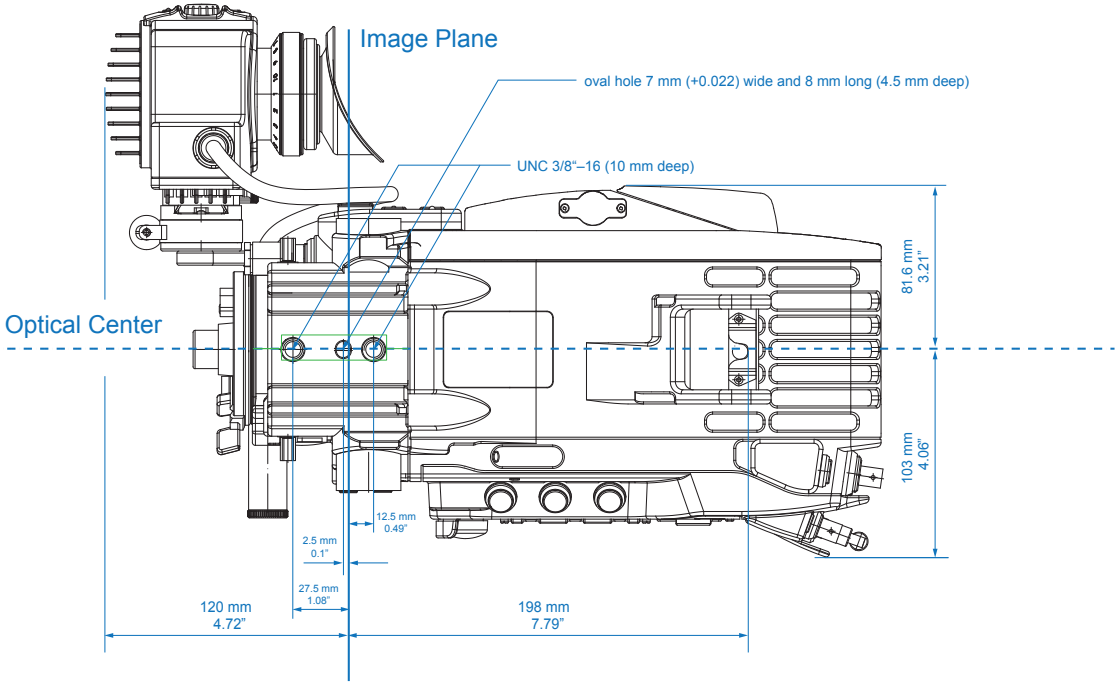
ALEXA Plus with XR Module

Technical Data are subject to change without notice.

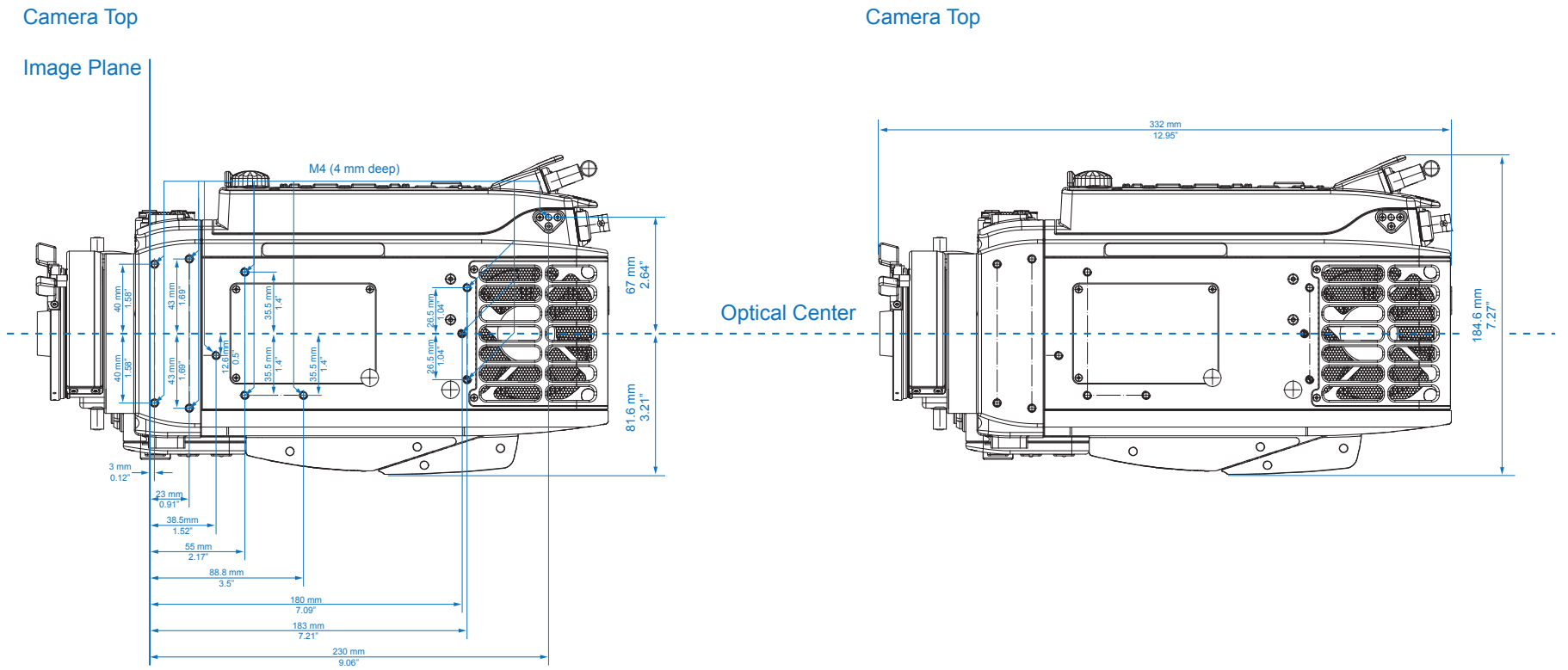
Camera Top



Camera Bottom



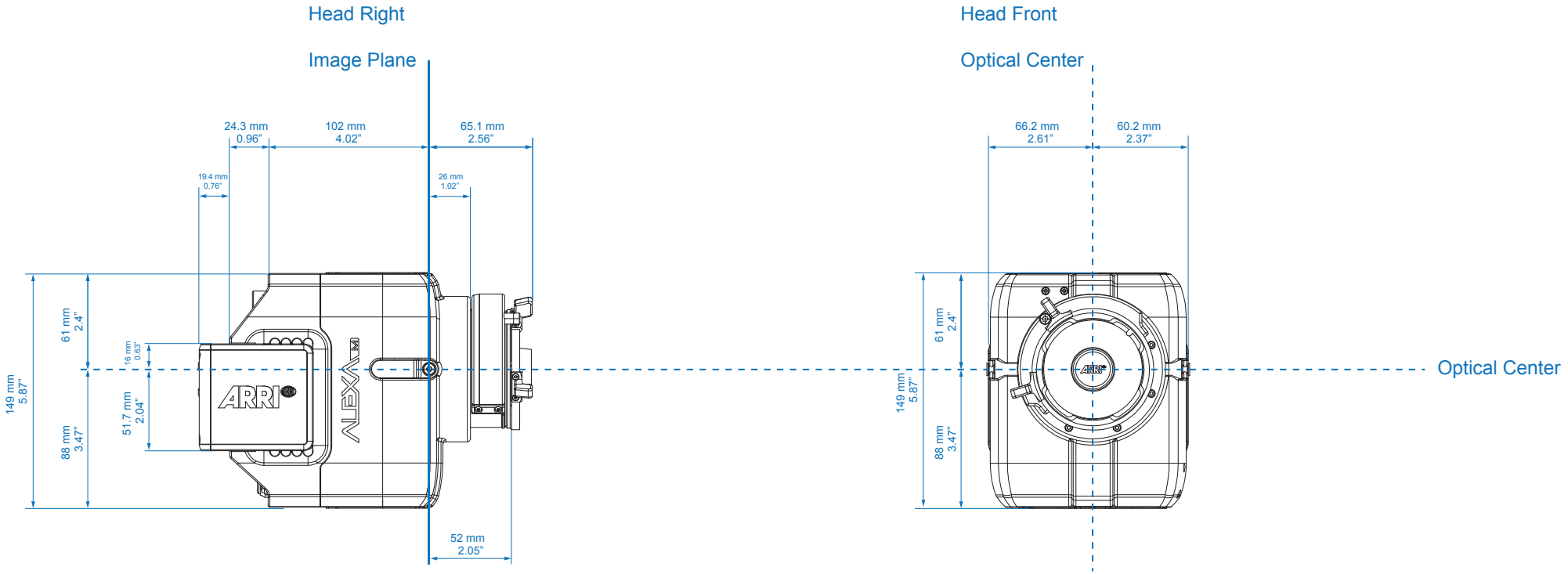
ALEXA Plus with XR Module



ALEXA M with XR Module

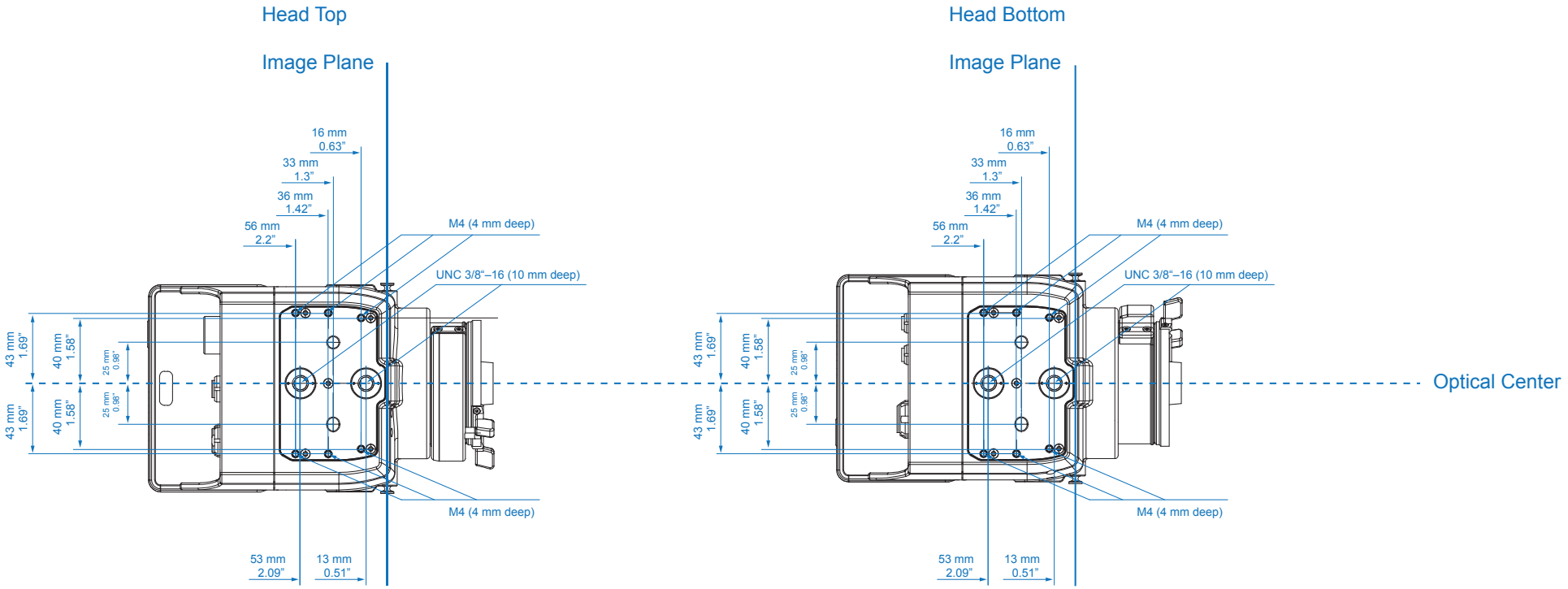
CAMERA DIMENSIONS – **Version 2013-04**

Technical Data are subject to change without notice.



ALEXA M	Length	Width	Height	Weight
ALEXA M Head	212 mm - 8.35”	129 mm - 5.08”	149 mm - 5.87”	2.9 kg - 6.39 lb
ALEXA M Backend with XR Module	323 mm - 12.72”	161 mm - 6.34”	158 mm - 6.22”	5.8 kg - 12.8 lb

ALEXA M with XR Module

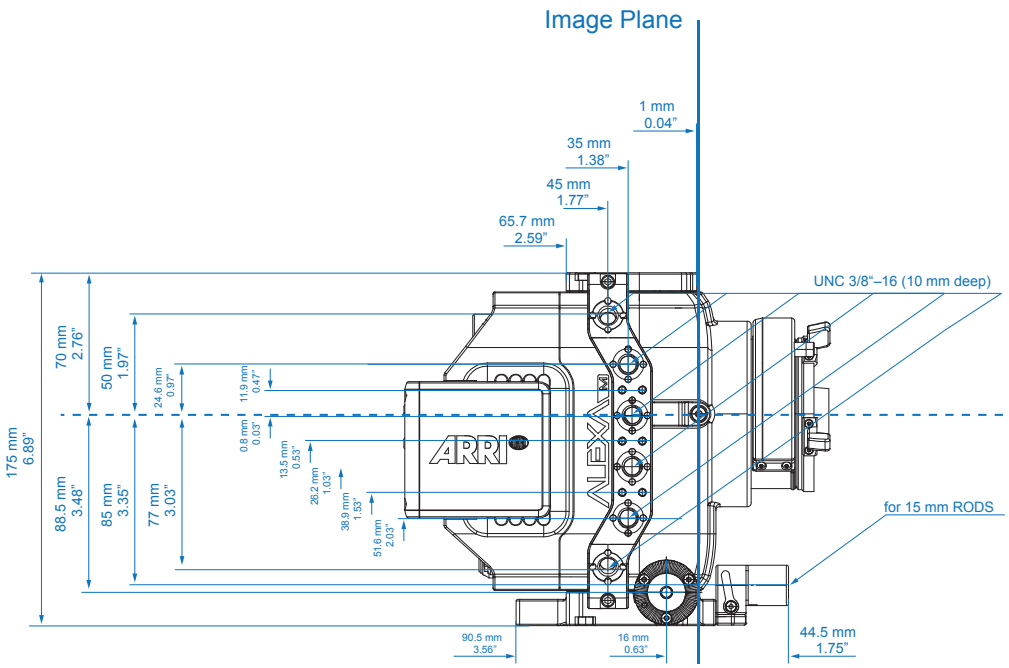


ALEXA M with XR Module

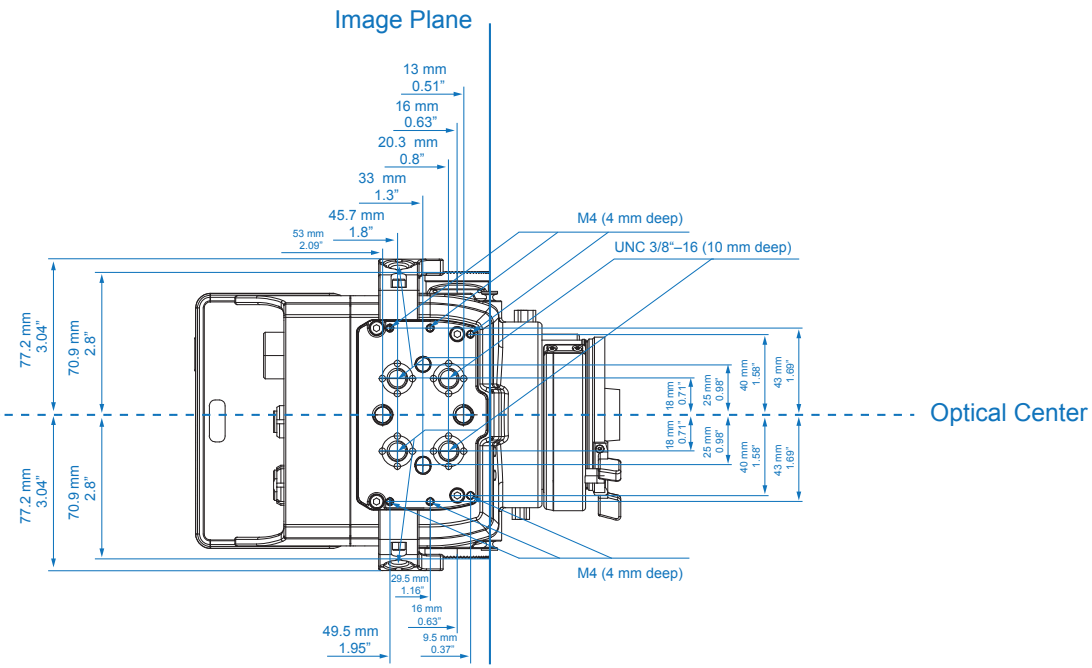
CAMERA DIMENSIONS – **Version 2013-04**

Technical Data are subject to change without notice.

Head with Cage Right



Head with Cage Top



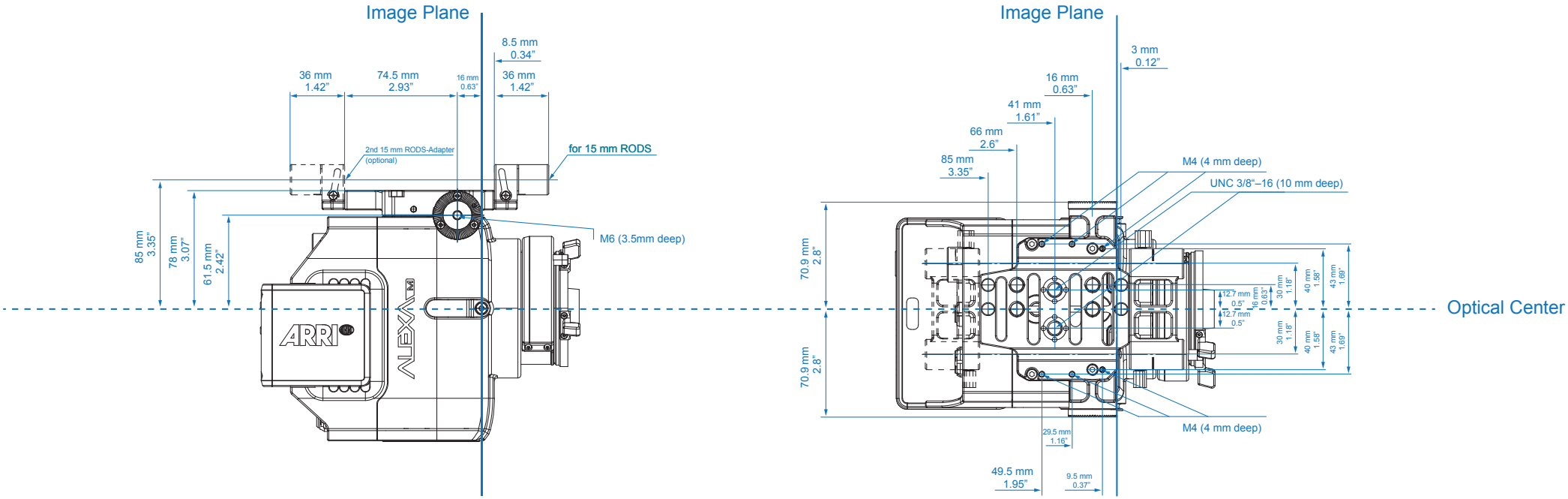
ALEXA M with XR Module

CAMERA DIMENSIONS – **Version 2013-04**

Technical Data are subject to change without notice.

Head with HEAD-PLATE-2 Right

Head with HEAD-PLATE-2 Top

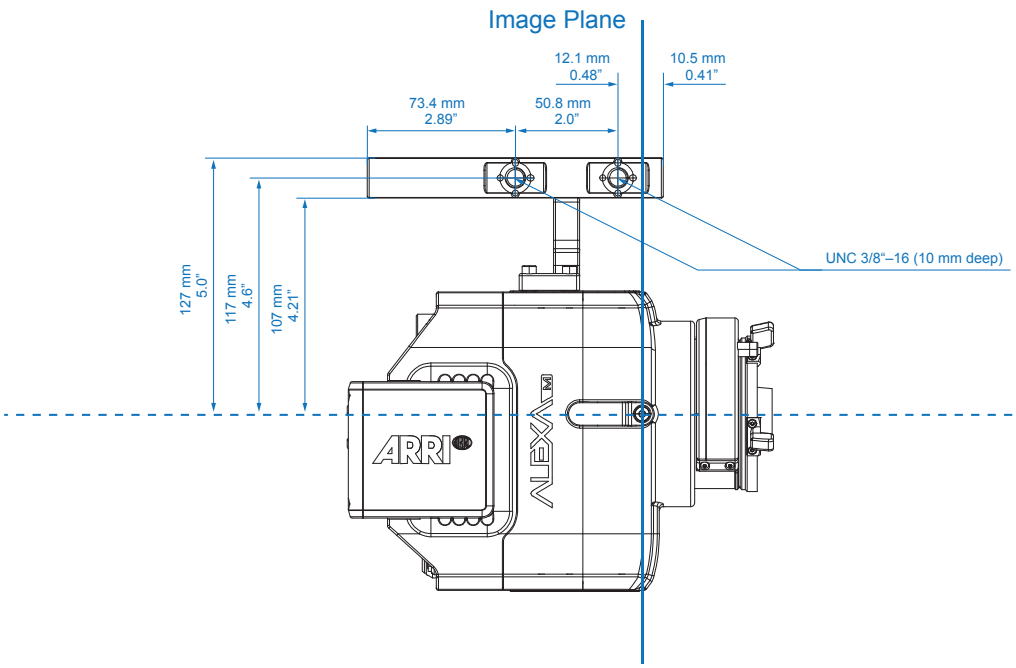


ALEXA M with XR Module

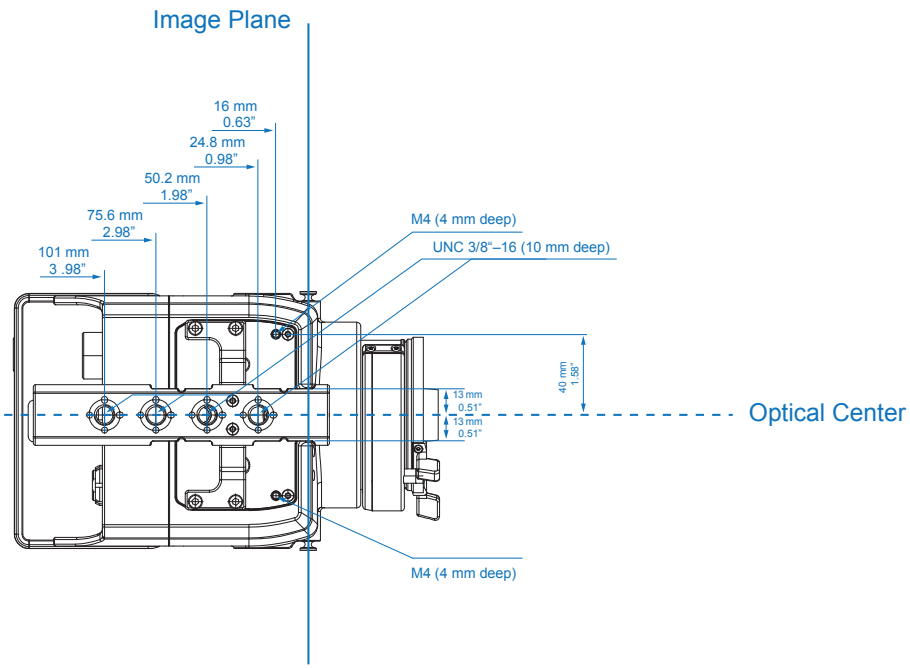
CAMERA DIMENSIONS – **Version 2013-04**

Technical Data are subject to change without notice.

Head with Handle Right

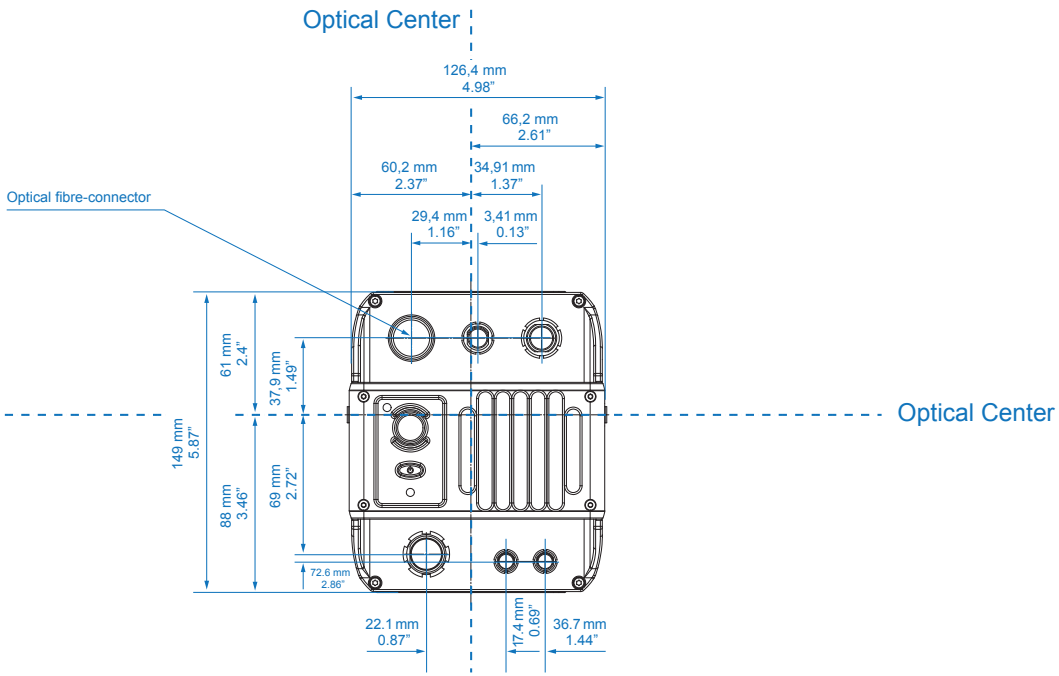


Head with Handle Top



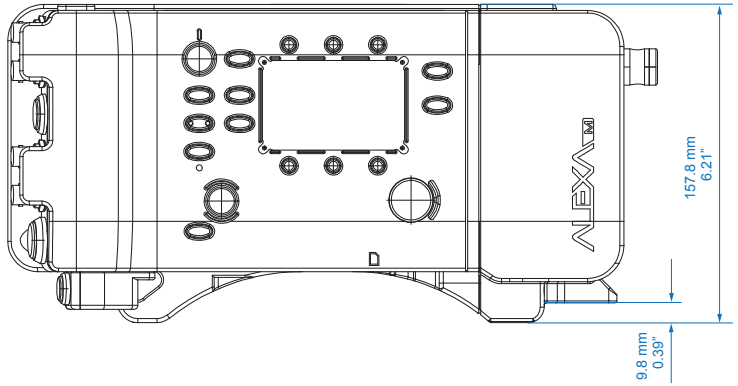
ALEXA M with XR Module

Head Rear View

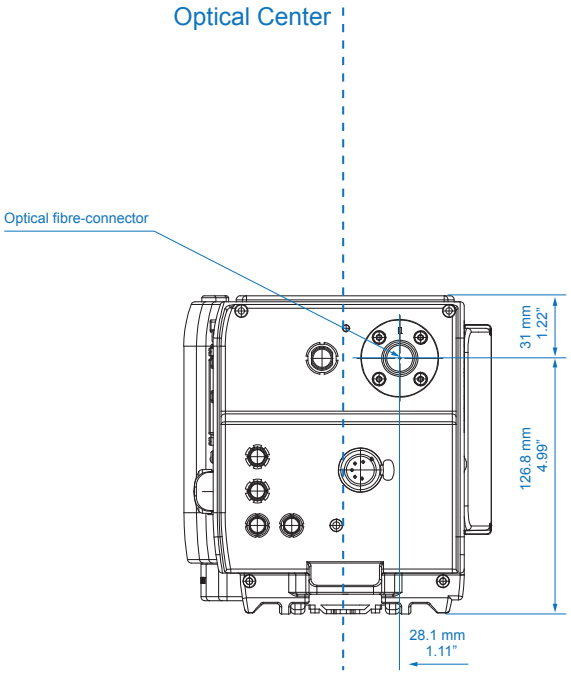


ALEXA M with XR Module

Backend Right



Backend Front

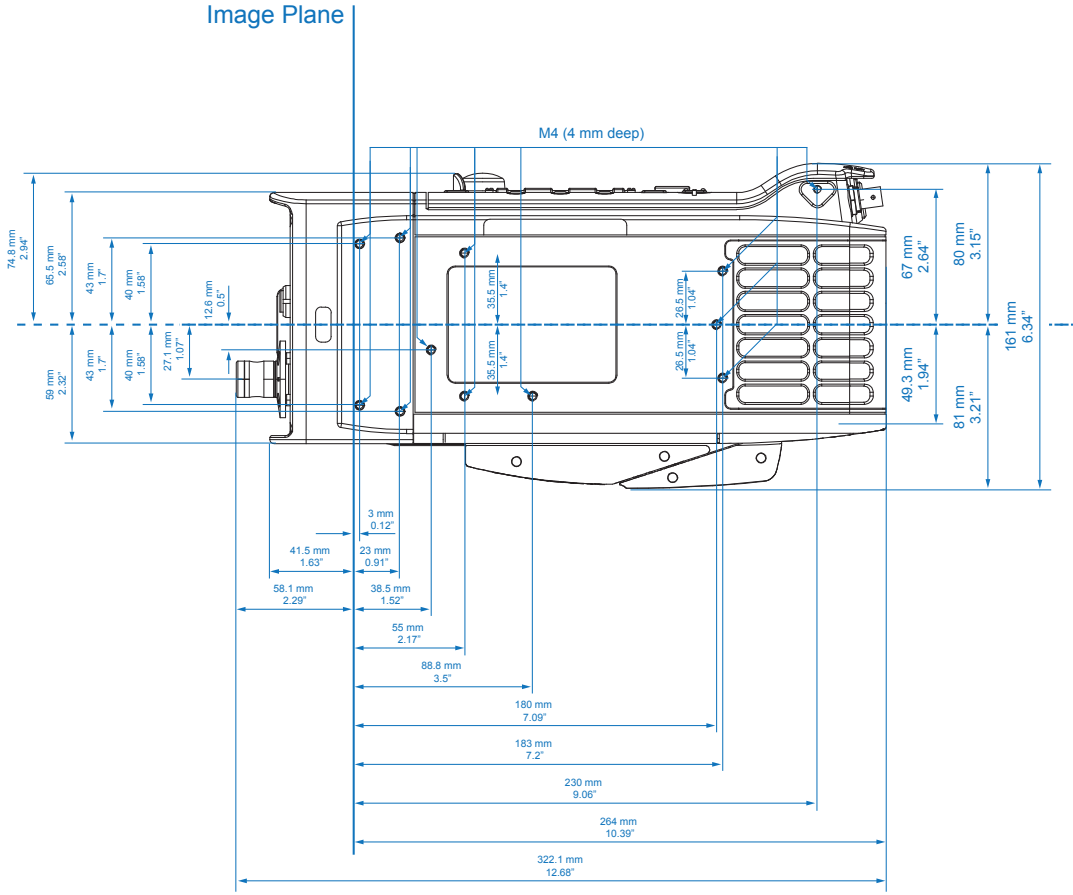


ALEXA M with XR Module

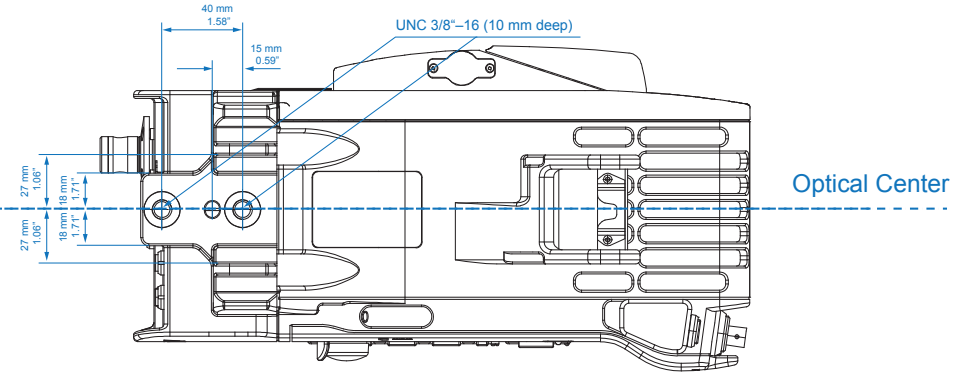
CAMERA DIMENSIONS – **Version 2013-04**

Technical Data are subject to change without notice.

Backend Top



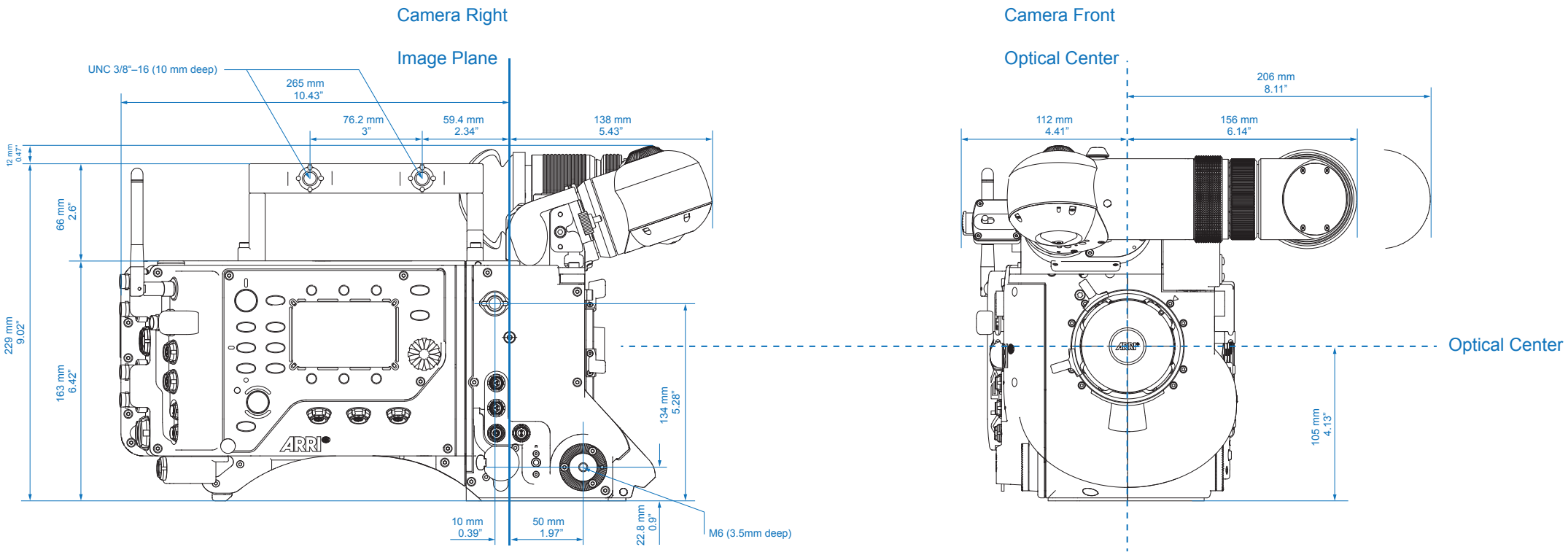
Backend Bottom



ALEXA Studio with XR Module

CAMERA DIMENSIONS – **Version 2013-04**

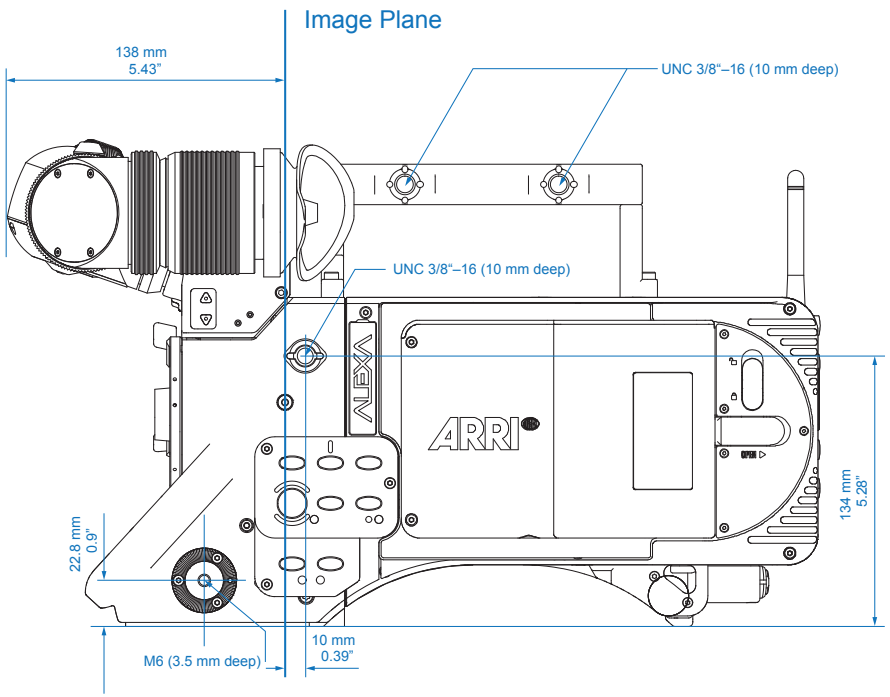
Technical Data are subject to change without notice.



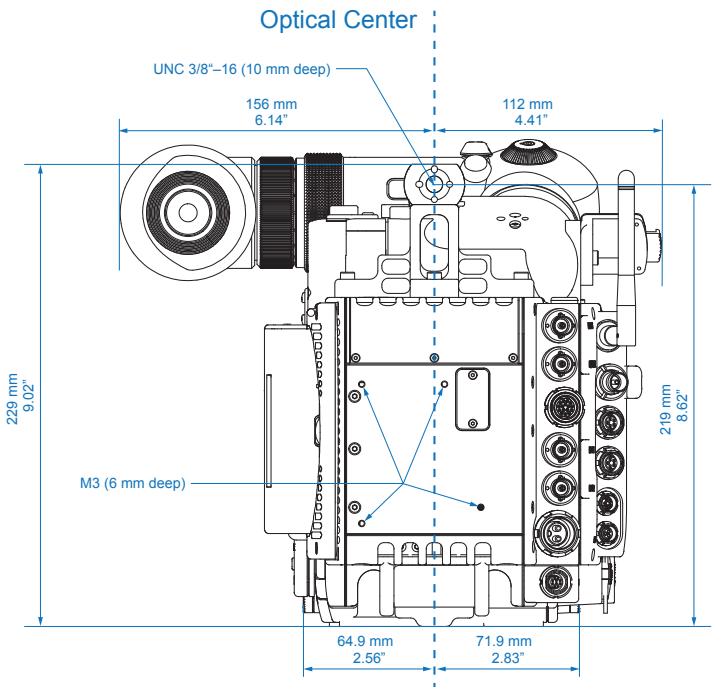
ALEXA Studio	Length	Width	Height	Weight
Body, XR Module	364 mm - 14.33"	183.6 mm - 7.23"	163 mm - 6.42"	8.3 kg - 18.3 lb
Body, XR Module, Camera Center Handle (CCH-1), Optical Viewfinder OVF-1	402 mm - 15.9"	268 mm - 10.55"	241 mm - 9.49"	10.5 kg - 23.1 lb

ALEXA Studio with XR Module

Camera Left



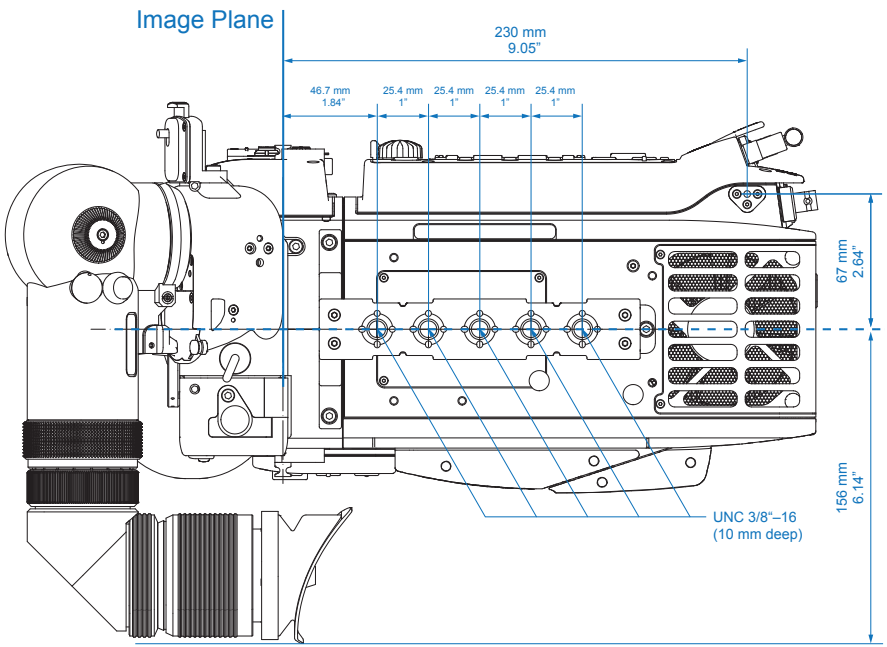
Camera Back



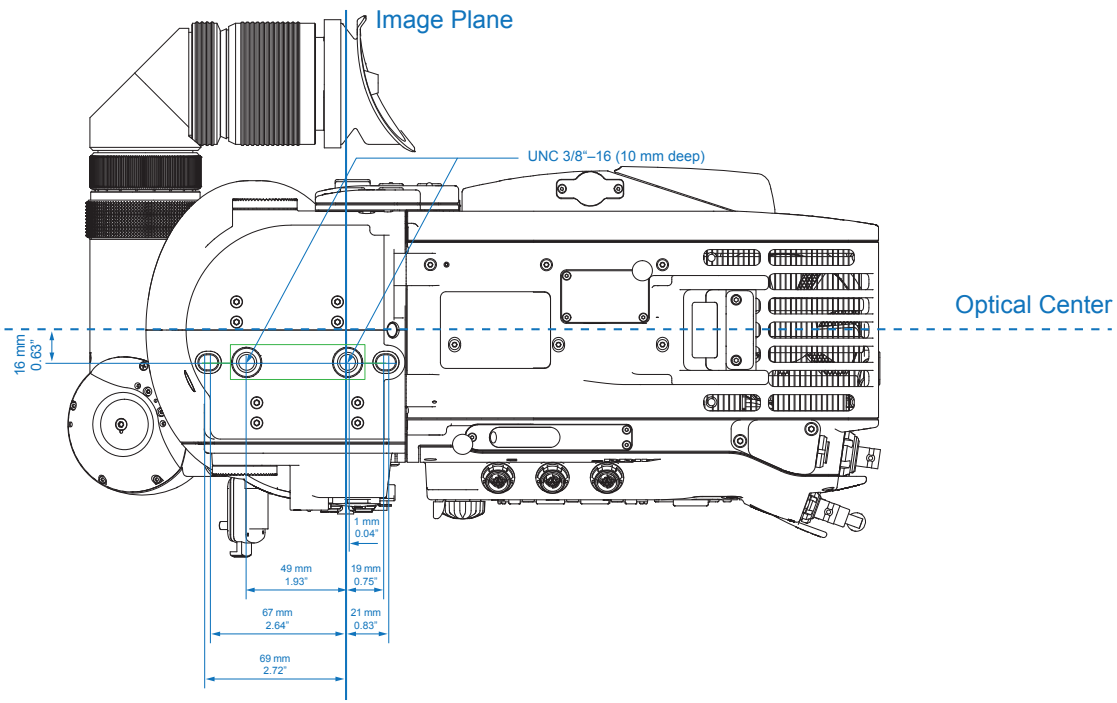
ALEXA Studio with XR Module

Technical Data are subject to change without notice.

Camera Top

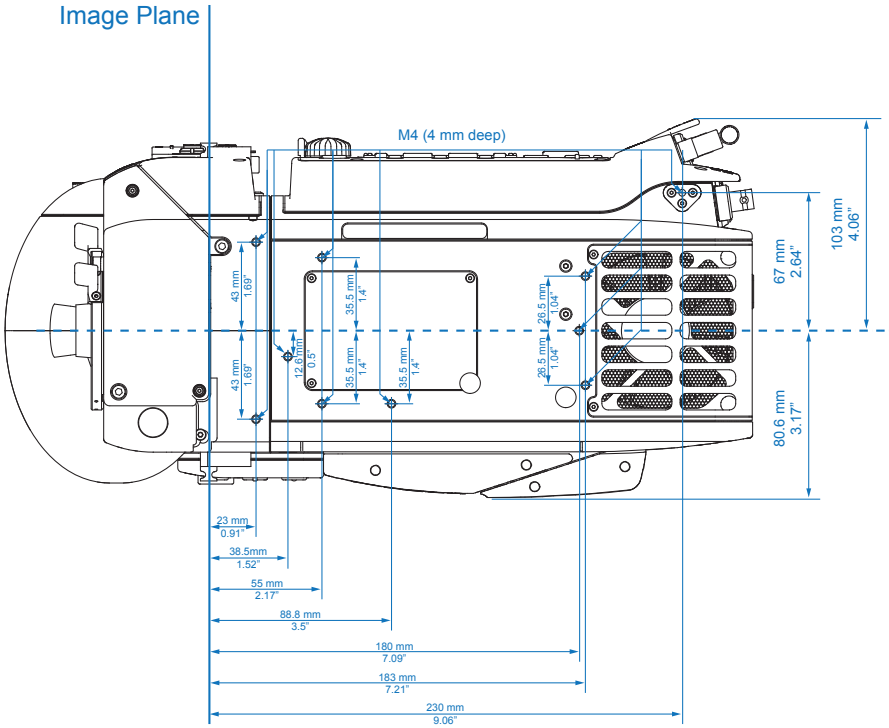


Camera Bottom

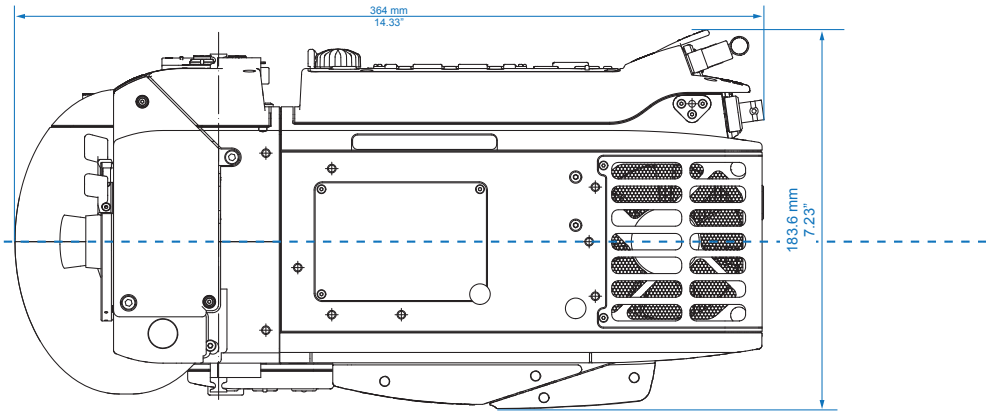


ALEXA Studio with XR Module

Camera Top



Camera Top



HOME

FPS

set sensor speed (0.75 fps-60fps /120fps*ALEXA XT/HS; 24fps)
add/delete value
HIGHSPEED/EXIT HS*ALEXA XT/HS (boot ALEXA to HS mode; 60-120fps)
MODE (MENU > RECORDING > INTERNAL)
MEDIA INFO (INFO > MEDIA INFO)
SDI FPS >>
REC OUT (23.976, 24, 25, 29.97 or 30fps)
MON OUT (23.976, 24, 25, 29.97 or 30fps)

Quick-option for choosing REC and MON fps

AUDIO

adjust CH1+/- (level +20/-10; unity)
adjust CH2+/- (level +20/-10; unity)
AUDIO OUT
set AUDIO OUT
Phones Level (+/-)
OPTIONS
AUDIO OUT > OPTIONS >>
Left out (CH1, CH2, CH1+2, None)
Right out (CH1, CH2, CH1+2, None)
Audio OUT level (Manual, Unity max.)
OPTIONS
AUDIO IN > OPTIONS >>
Record (On/Off)
Channel 1/2 level (Manual/Unity)
Channel 1/2 source (L/R in)
Soundroll (=Tape) (edit name)

Change volume of channel 1 and 2 with jogwheel

SHUTTER

set shutter angle (5.0°-358.0°; 172,8°)
in highspeed mode (5.0°-356.0°)*ALEXA XT/S
add/delete value
see calculated exposure time
MIRROR*ALEXA XT STUDIO/STUDIO (On/Off)

Limited to 11.2°-180.0° on ALEXA (XT) STUDIO with enabled mirror shutter

Enable mirror shutter on ALEXA (XT) Studio

EI

set exposure index (160ASA-3200ASA; 800ASA)
ND FILTER*ALEXA XT STUDIO/STUDIO (On/Off)

BACK & JOGWHEEL

press BACK while turning the jogwheel to change the display brightness

continued on next page

HOME

COLOR

SET LOOK
- *choose/delete/load look from SD*
- *ARRI LCC look loaded by default*
- CDL CONF*ALEXA XT > set ip adress
- CDL (On/Off)*ALEXA XT

set COLORPATH
- EVF (Look ON/OFF for REC 709)
- MON OUT (Look ON/OFF for REC 709)
- INTERNAL, REC OUT } (Look ON/OFF for REC 709)*ALEXA XT

GAMMA

COLOR > GAMMA >>
- INTERNAL (REC 709, LOG C, RAW)*ALEXA XT
- REC OUT (REC 709, LOG C)
- MON OUT (REC 709, LOG C)
- EVF (REC 709, LOG C)

WB

set WHITEBALANCE (2000K-11000K, Auto WB; 5600K; and CC SHIFT)
- *add/rename/delete value*

MENU

RECORDING menu

Internal >>
- Mode (Off/ProRes/ARRIRAW)
- Codec (ARRIRAW, ProRes 422 Proxy/422 LT/422/ ProRes 422 HQ/4444)
- Resolution (HD (1920x1080)/2K (2048x1152/1536)*ALEXA XT/4:3)
- Quick format SxS Card/Capture Drive
- Erase SxS Card

REC OUT >>
- Framerate (23.976/24/25/29.97/30/48/50/59.94/60fps)
- HD-SDI format (422 1.5G SL/422 1.5G DL/422 3G SL 444 1.5 DL/444 3G SL/444 3G DL or MON OUT clone)
- Scan format (psf/p)
- Output range (Legal/Extended/Raw)
- REC OUT fps sets sensor fps (On/Off)

Options may differ depending on selected sensor mode.

*Please note: This chart reflects the ALEXA XT/XR menu, all differences from the ALEXA menu are being indicated by annotations (*ALEXA XT).*

continued on next page

***ANAMORPH** = requires Anamorphic Desqueeze License ***DNxHD** = requires DNxHD License ***HS** = requires High Speed License
***XT** = ALEXA XT (all models) only ***PLUS** = ALEXA PLUS only ***PLUS 4:3** = ALEXA PLUS 4:3 only ***STUDIO** = ALEXA STUDIO only ***M** = ALEXA M only

MENU

MONITORING menu

Electronic viewfinder >>
- Brightness (0-5)
- Rotate image (On/Off)
- Smooth mode (On/Off)
- Surround view (On/Off)
- Frame lines + status info >>
  - Frame lines (On/Off)
  - Surround mask (Black line/Color line/Mask 25%/50%/75%)
  - Center mark (Off/Medium dot/Small dot/Cross)
  - Status info (On/Off)
  - Electronic horizon(On/Off)
  - LDS info (On/Off)
- Peaking (Off/On) >>
  - Peaking (On/Off)
  - Peaking level (Low/Medium/High)
- Anamorphic desqueeze*ALEXA XT/ANAMORPH (Off/1.3x/2.0x/2.0xmag)
- Zoom position (Centered/Eye level)

MON OUT >>
- Framerate (23.976/24/25/29.97/30fps)
- Scanformat (psf/p)
- Surround view (On/Off)
- Frame lines + status info >>
  - Frame lines (On/Off)
  - Surround mask (Black line/Color line/Mask 25%/50%/75%)
  - Center mark (Off/Medium dot/Small dot/Cross)
  - Status info (On/Off)
  - Electronic horizon (On/Off)
  - LDS info (On/Off)
  - Camera index letter (On/Off)
- Peaking (Off/On) >>
  - Peaking (On/Off)
  - Peaking level (Low/Medium/High)
- False color (On/Off)
- Anamorphic desqueeze*ALEXA XT/ANAMORPH (Off/1.3x/2.0x/2.0xmag)

Frame lines >>
- Frame line 1 (choose/add/delete; Off)
- Frame line 2 (choose/add/delete; Off)
- User rectangles >>
  - User rectangles (Off/Rect 1/Rect 2/Rect 1+2)
  - Set rect 1/2 >>
    - Top, Bottom, Left, Right (0-1000), Reset
  - Color (Red/Green/Blue/Yellow/Black/White)
  - Intensity (1-4)

RET IN path (EVF, MON OUT, EVF+MON)
Electronic horizonsensitivity (1x, 2x, 4x, 8x, 16x)
False color index >>

continued on next page

MENU

PROJECT menu

Sensor Mode*ALEXA XT/STUDIO/M/PLUS 4:3 (16:9/4:3)
Rec. resolution (Menu > Recording > Internal)
Codec (Menu > Recording > Internal)
Project frame rate (23.976/24/25/29.97/30fps)
Camera index (A-Z)
Next reel count (001-999)
Production info >>
- Production
- Prod. Company
- Director
- Cinematographer
- Camera Operator
- Location
- Scene
- Take
- User Info 1/2

SYSTEM menu

Sensor >>
- Sensor mode*ALEXA XT/STUDIO/M/PLUS 4:3 (16:9/4:3)
- Sensor temperature (Standard/High humidity)
- Mirror image horizontal (On/Off)

Power >>
- BAT1 (Plug) warning (10.0-30.0V; 21.0V)
- BAT2 (Onboard) warning (10.0-30.0V; 12.0V)

External sync >>
- Eye index (L/R)
- Sensor sync (Off/EXT master/EXT slave)
- HD out phase (+/-30 clocks; 0 clocks)
- Send HD sync trigger >
- Settings sync (Off/ETH master/ETH slave)

Test signal >>
- Color bar (On/Off)
- Enable test tone (On/Off)
- Test tone level (0 dB(fs)/-9 dB(fs)/-18 dB(fs))

Display + beeper >>
- Display button brightness (0-8)
- Button brightness (Off/Low/Medium/High)
- Run beeper mode (Off/Start/Stop/Start+Stop)

System time + date >>
- set date, time, timezone and daylight saving time

Fan >>
- Fan mode (Regular/Rec low)

SD card >>
- Format + prepare SD card
- Prepare SD card

Firmware >
- Select update file >>
- Licensed features >>
  - install/delete licenses; save hardware info

continued on next page

MENU

LDS *ALEXA XT M/M

see Lens Data for PLUS/STUDIO

FRAME GRABS menu

File format (Jpeg/Tiff/Dpx/Ari)
Compare grab to live image >>
load grab
Options Compare Options >>
Compare mode (Toggle/Interleave)
Active on EVF (On/Off)
Active on MON OUT (On/Off)
Grabbed images inherit REC OUT settings!
Ari only possible, when REC OUT = ARRI RAW

USER SETUPS menu

Save current setup
Load setup
Factory reset

USER

USER BUTTON ASSIGNMENT

set Button 1, 2, 3
None
MON OUT surround
MON OUT gamma
MON OUT look
MON OUT frame lines
MON OUT status info
MON OUT false color
MON OUT peaking
MON anam. desqu. *ALEXA XT/ANAMORPH
Frame lines color
EVF surround
EVF gamma
EVF look
EVF frame lines
EVF status info
EVF zoom
EVF false color
EVF peaking
EVF anam. desqu. *ALEXA XT/ANAMORPH
Grab still frame
Return in active
Check last clip
Circle clip
Auto WB
Phase sensor
Color bars
Grab GUI

set Button 4, 5, 6
None
MON OUT surround
MON OUT gamma
MON OUT look
MON OUT frame lines
MON OUT status info
MON OUT false color
MON OUT peaking
MON anam. desqu. *ALEXA XT/ANM.
Return in active
Frame lines color
Phase sensor
Color bars
False color index
Format media
Mirror shutter *ALEXA (XT) STUDIO

***ANAMORPH** = requires Anamorphic Desqueeze License ***DNxHD** = requires DNxHD License ***HS** = requires High Speed License
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PLAY

PLAYBACK screen

start Playback of last clip *(press wheel or PLAY 2x on operator's side)*
+/- 10%
CLIPLIST
OPTIONS
PLAY Options >>
Clip end action (Pause/Loop)
Show frame lines (On/Off)
Status info on MON OUT (On/Off)
STEPSIZE (1 frame/1 second)
CIRCLE CLIP

INFO

SYSTEM INFORMATION screen

LIVE INFO
SAVE TO SD
VERSION
SxS CARDS
SYSTEM
FPS INFO

GRAB

FRAME GRAB TRIGGER

save Framegrab to SD Card

TC

TIMECODE screen

SET TC (SET TO TIME/RESET/MANUAL)
OPTIONS
Timecode Options >>
Source (Int TC/Ext LTC)
Mode (Rec run/Free Run)
Generator (Regen/Jam Sync)
User bit source (Internal/LTC in UB)
USERBITS (set Userbits)
PROJECT (Menu > Project)

LOCK

BUTTON LOCK

locks HOMESCREEN,MENU, PLAY, TC and INFO;
*also locks the buttons on EVF and WRS*ALEXA (XT) PLUS & STUDIO!*

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WRS*ALEXA (XT) PLUS/PLUS 4:3 & STUDIO

RADIO

On ALEXA XT M and ALEXA M via SYSTEM > LDS

STATUS
- Channel: 0
- Units: 0
- Ready/Off

WRS > RADIO >>
- WRS radio power (On/Off)
- WRS radio channel (0-7)

CAM LEVEL

STATUS READOUT FROM SENSORS
- Tilt: 0.0°
- Roll: 0.0°

CAM LEVEL > RESET
- *use to reset your null balance*

LENS DATA

LDS READOUT
- Status

LENS DATA
- *displays FOCAL LENGTH, IRIS, FOCUS and DoF close/far*

LDS OPTIONS
- Lens distance unit (Metric, Imperial, Default Unit)
- Circle of confusion (0.013/0.025/0.035/0.050mm)
- Inverse iris scale (On/Off)
- Inverse zoom scale (On/Off)
- Inverse focus scale (On/Off)

LDA *available when non-LDS lens in use*
- manage lens data for non-LDS lenses

Options may differ depending on the lens you're using (LDS/Non-LDS)

IRIS/ZOOM/FOCUS CLM

CLM STATUS
- *displays TYPE, DIRECTION and TORQUE(1-4; CLM-3 & 4)*

IRIS/ZOOM/FOCUS CLM
- set DIRECTION
- set TORQUE (only for CLM-3 & 4)
- CALIBRATE/CALIBRATE ALL motors

ELECTRONIC VIEWFINDER **EVF-1**

ZOOM

magnify EVF image 2.25x (toggle mode)

EXP

false color exposure check (toggle mode)

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ELECTRONIC VIEWFINDER **EVF-1**

CAM

FPS

set sensor speed (0.75 fps - 60fps /120fps*ALEXA XT/HS; 24fps)

SHUTTER

set shutter angle (5.0°-358.0°; 172,8°;
in High Speed Mode 5.0°-356.0°)*ALEXA XT/HS

EI

set exposure index (160ASA - 3200ASA; 800ASA)

WB

set white balance (2000K - 11000K, Auto WB; 5600K;
and CC SHIFT)

EVF

EVF menu

Brightness (0-5)
Rotate Image (On/Off)
Smooth Mode (On/Off)
Surround View (On/Off)
Surround Mask (Black line/Color Line/Mask 25%/50%/75%)
Status Info (On/Off)
Frame Lines (On/Off)
Select Frame Lines 1 (choose from list)
Select Frame Lines 2 (choose from list)
Center Mark (Off/Medium dot/Small dot/Cross)
User Rectangles (Off/Rect 1/Rect 2/Rect 1&2)
Edit User Rectangles (only when User Rectangles active)
Frame Lines Color (Red/Green/Blue/Yellow/Black/White)
Frame Lines Intensity (1-4)

MIRROR CONTROL *ALEXA (XT) STUDIO

VIEW

switch to VIEW-mode (operator sees an image)
press VEW + GATE for spinning mirror

GATE

switch to GATE-mode (sensor & all video outs "see" an image)
press GATE + VIEW spinning mirror

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